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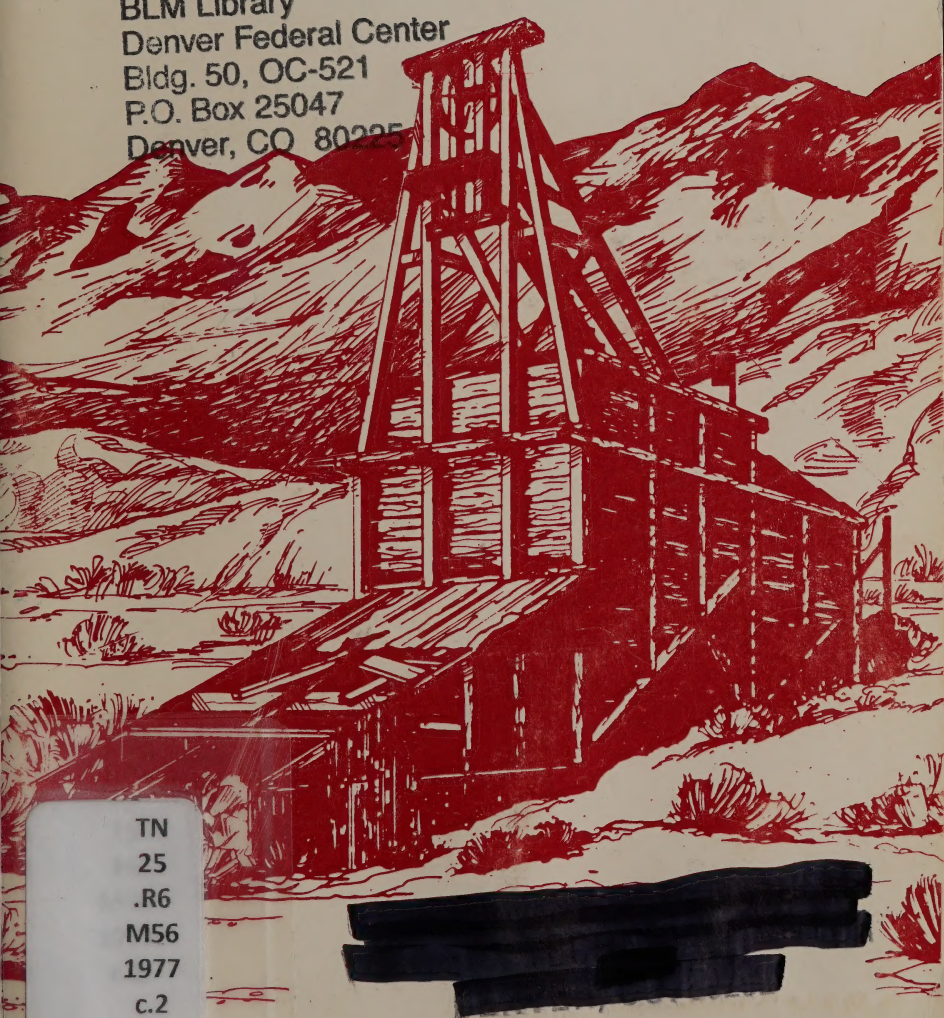

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A Visitor Guide

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MINING AND MINERAL OPERATIONS IN THE ROCKY MOUNTAIN STATES

A VISITOR GUIDE

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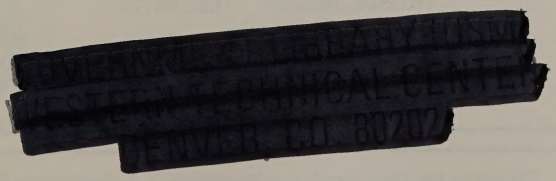

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1977

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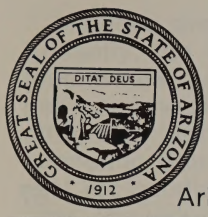

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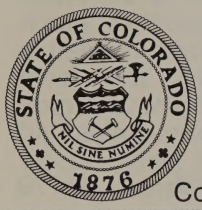

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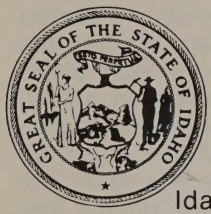

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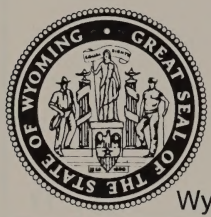

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INTRODUCTION

Minerals are vital to any industrialized civilization. Annually, the United States uses more than 4 billion tons of new mineral materials, or about 40,000 pounds per person—about half being mineral fuels and the other half being metals and nonmetallics. Stable and economic domestic mining, mineral, metal, and mineral reclamation industries are essential to the economy. The value of United States energy and processed materials of mineral origin exceeds $200 billion annually. Although a number of minerals are imported, especially some designated as "strategic and critical," most U.S. mineral supplies are derived from the domestic mines and processing facilities that you will be seeing, reading about, and visiting as you use this visitor guide. We hope you enjoy your experiences.

This pamphlet, a guide to mining and mineral operations that may be observed or visited and some other points of interest relating to minerals, is intended to aid tourists and students who are interested in mining. Some may wish to study our Nation's romantic past; others may plan to enter the minerals industry as a career; still others may have a primary interest in conservation practices. The pamphlet is also intended to aid State and local officials, Chambers of Commerce, and mining firms in answering some of the many questions of tourists and students.

Six visitor guides have been prepared covering mining and mineral operations in the United States. The regions covered by these guides are the New England and Mid-Atlantic States, the South Atlantic States, the North-Central States, the South-Central States, the Rocky Mountain States, and the Pacific States.

The text presents interesting highlights about mines and mineral operations that travelers may see from the highways. Longer descriptions of mines and plants that can be visited sometimes are provided. The mines mentioned are representative examples and are those most easily observed from, or are near, major highways. There are many others that are operating but are more remote. Selected references for detailed study are also included.

The Bureau of Mines publishes a Minerals Yearbook each year that summarizes the national production and status of each mineral commodity. The mineral industry production and status for each State are described in separate chapters. The Yearbook may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Separate chapters are available free from the Publications Distribution Branch, Bureau of Mines, U.S. Department of the Interior, 4800 Forbes Avenue, Pittsburgh, Pa. 15213.

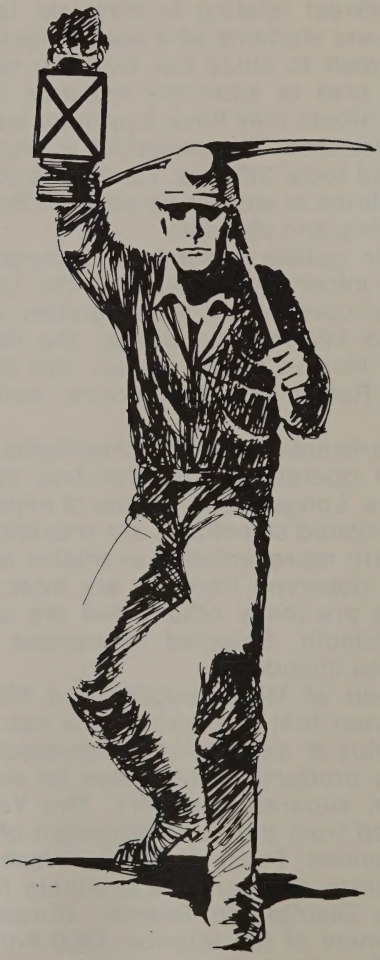
Students who have a deep interest in some branch of mining will find most mine managers willing to help, even though the mine may not be open to casual tourists.

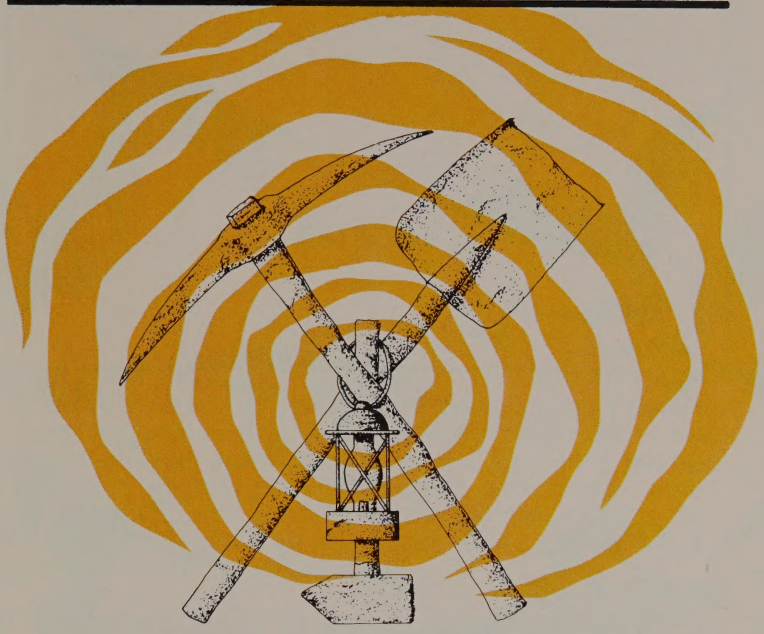
If you leave well-traveled highways to visit ghost towns, tell someone where you are going and when you expect to get back. You should also inquire locally about road conditions before traveling unpaved or unimproved roads.

Bring your camera. Many prize-winning photographs have been obtained at the areas mentioned in this pamphlet.

ACKNOWLEDGMENTS

Acknowledgments are due those who helped prepare this pamphlet. State geologists, State Offices of Information, Chambers of Commerce, mine managers, and Bureau personnel have freely contributed data.





CAUTION

Remember that abandoned mines are death traps. Stay out of them. Old shafts often cave near the surface and form a funnel-shaped opening. Unwary visitors have been trapped in these funnels. Stay away from old shafts

Always use available guide services. Mine openings (tunnels, adits, open pits) should never be entered except with a competent guide.

Sometimes the air is bad in abandoned mines and is not safe to breathe. Explosive gas may also be present. Gases frequently come from the rocks themselves, but during active operations, they are swept out of the mine by the controlled ventilating current.

Remember, too, that even the oldest mines usually are private property. Most mine owners do not object to the collection of a few mineral specimens (some do charge a fee), but all object to touring vandals, who wantonly destroy buildings and equipment, or to inexperienced trespassers, who present a hazard to themselves, the property, and the owners.

ARIZONA

by

Floyd D. Everett

More than half of the Nation's copper supply comes from Arizona mines. Other minerals produced in the State include molybdenum, silver, and gold as by-products of copper mining, sand and gravel, coal, stone, lead, zinc, petroleum, natural gas, helium, asbestos, diatomite, feldspar, fluorspar, gypsum, iron ore, mica, perlite, and tungsten.

MINES AND PLANTS YOU CAN SEE FROM THE HIGHWAY

U.S. 60, U.S. 70, Ariz. 77, Ariz. 88.—These highways intersect in the vicinity of the highly productive Globe-Miami mining district, discovered in 1872 (map location 1). The large waste pile on the north side of the highway west of Globe is from the Old Dominion mine. This underground mine was worked almost continuously for 50 years until 1931, and workings extend more than one-half mile below the surface. Production was valued at $125 million in copper, gold, and silver.

1

2

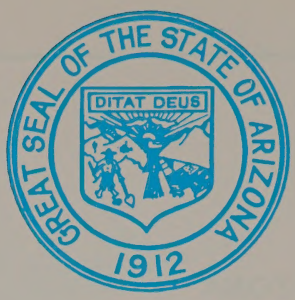
West of the intersection of Ariz. 88 with U.S. 60 and U.S. 70 and at the town of Miami are the huge tailings piles from the Miami underground mine and the Inspiration open pit and underground mine (map locations 2–3). The new Miami East underground mine is being developed 3,300 feet below the surface. Inspiration Consolidated Copper Co. is constructing a new smelter using a non-air-polluting electric furnace; the new smelter is adjacent to the older smelter that can be seen on the hill to the north of the road. A copper rod fabricating plant is on the south side of the road.

3

West of Miami, 2 to 3 miles on the north side of the highway, can be seen the Bluebird mine, leach dump, and leaching-electrowinning plant of Ranchers Exploration and Development Corp. (map location 4). Copper is recovered from acid solutions without smelting. Two miles west of the Bluebird mine is the Oxhide mine-leach operation of Inspiration Consolidated Copper Corp. (map location 5).

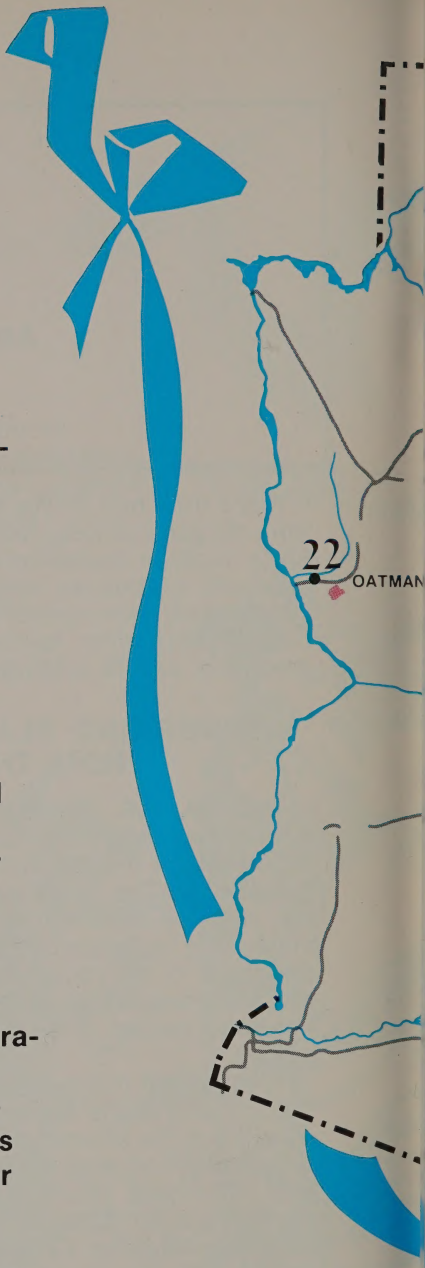
4

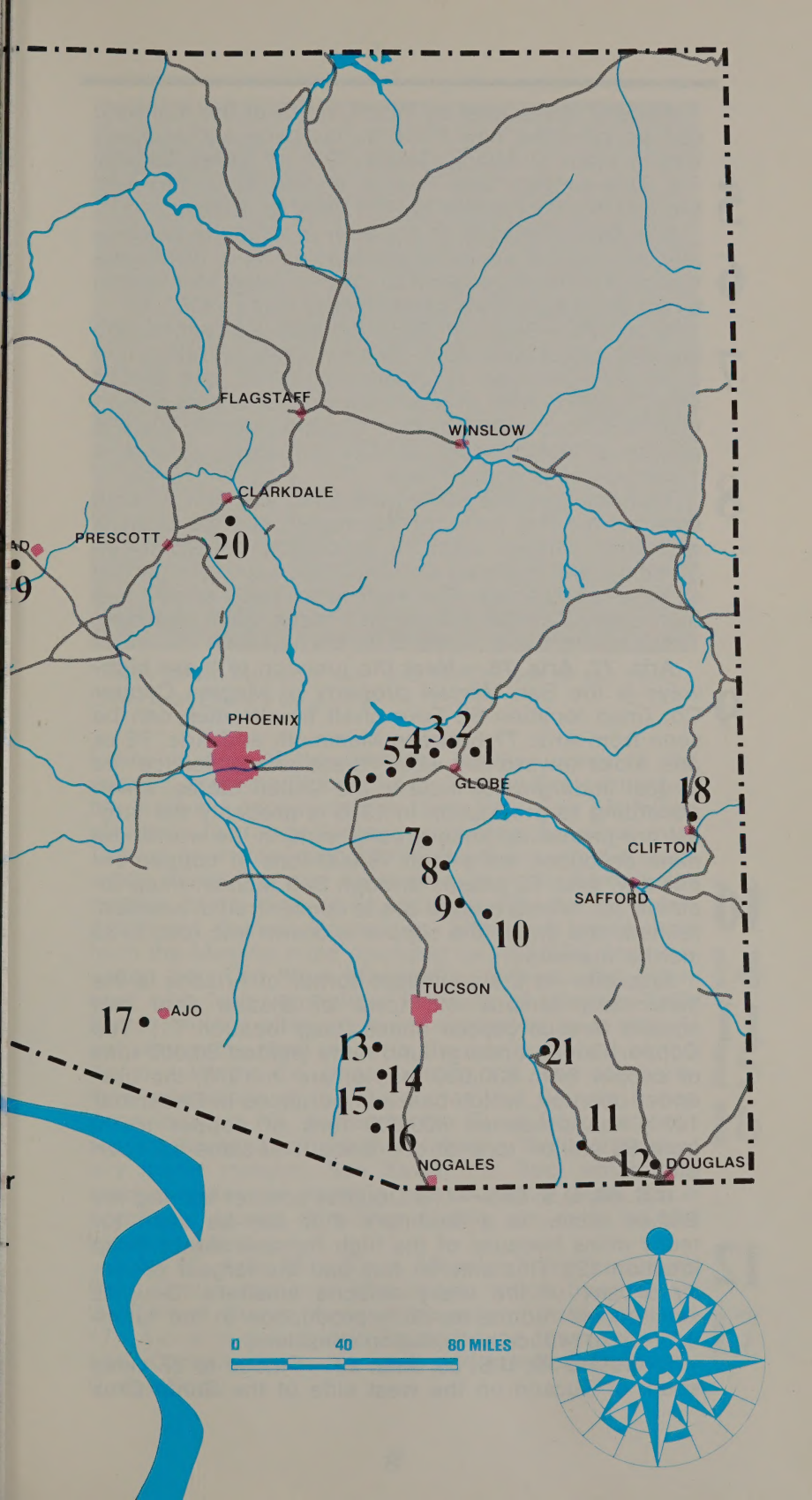
5



LEGEND

1— Old Dominion underground copper mine
2— Miami underground copper mine
3— Inspiration open pit copper mine
4— Bluebird open pit copper mine
5— Oxhide mine-leach operation
6— Magma underground copper mine
7— Ray open pit copper mine
8— Copper smelters
9— San Manuel underground copper mine
10— San Manuel concentrator and smelter
11— Open pit and underground copper mines
12— Large copper smelter
13— San Xavier open pit copper mine
14— Mission open pit copper mine
15— Pima and Twin Buttes open pit copper mines
16— Esperanza and Sierrita open pit copper mines
17— New Cornelia open pit copper mine
18— Morenci and Metcalf open pit copper mines
19— Bagdad open pit c mine
20— Douglas Memorial ing Museum
21— Historic silver min camp
22— Historic gold mini district




FLAGSTAFF
WINSLOW
CLARKDALE
PRESCOTT
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PHOENIX
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GLOBE
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CLIFTON
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SAFFORD
TUCSON
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AJO
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16
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12
NOGALES
DOUGLAS
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40
80 MILES

About 7 miles west of Miami, north of the highway, can be seen the new Pinto Valley mine and concentrating plant of Miami Copper Div. of Cities Service Co. This project was started in late 1972 and was brought into production in 1974 (map location 5).

5

U.S. 60.—The town of Superior is a mining community serving the needs of the Magma mine of Magma Copper Co. (map location 6). The smelter, identifiable by the large stack, has been inactive since 1970.

6

Ariz. 177.—Between Superior and Winkleman, the big Ray pit of Kennecott Copper Corp. parallels the road (map location 7). About 13 million tons of ore and 27 million tons of waste cap rock are mined each year to produce 100,000 tons of copper metal, 800,000 pounds of molybdenum, 237,000 ounces of silver, and 1,180 ounces of gold.

7

Two smelters are at Hayden (map location 8). One services the Ray mine for Kennecott, and the other is a custom smelter servicing operations of American Smelting and Refining Co. (ASARCO) and properties of other companies. The Kennecott stack is 600 feet high, and ASARCO is building a stack 1,000 feet high. These stacks can be seen from the highway.

8

Ariz. 77, Ariz. 76.—Near the junction of these highways is the San Manuel property of Magma Copper Co. (map location 9). Four shaft headframes can be seen from Ariz. 77 between Mammoth and Ariz. 76 as one looks toward the west. These shafts service the largest underground mine in the United States, which according to production in 1973 is probably the largest ore-producing underground mine in the world; the mine produces more than 75,000 tons of copper ore per day. Ariz. 76 passes through San Manuel (map location 10), where copper ore is concentrated, smelted, refined, and finally the copper is drawn into rods 5/32 inch in diameter.

9

10

Ariz. 80.—In the southeast corner of Arizona is the historically famous old town of Bisbee near two equally famous copper mines (map location 11). The Copper Queen underground mine yielded 30,000 tons of copper from 830,000 tons of ore in 1970; the Lavender open pit, which ceased operations in December 1974, has produced 609,000 tons of copper metal from 90 million tons of ore since it became an open pit.

11

U.S. 80, U.S. 666.—The Douglas smelter serving the Bisbee mines is a landmark that can be seen for many miles because of the high furnace stacks (map location 12). This smelter has had the largest capacity of any of the many Arizona smelters. Douglas smelter will reduce its daily production in the future in order to reduce air pollution emissions.

12

Interstate 19, U.S. 89, Ariz. 93.—Fifteen to 27 miles south of Tucson on the west side of the Santa Cruz

Sierrita mine, Esperanza mill, and Sierrita mill of the Duval Corp. near Green Valley, Ariz.

Valley is one of the greatest mineral areas in the country (map locations 13–16). Twenty-five percent of the Nation's copper comes from five open pit mines of which the huge tailings piles can be seen from Tucson on a clear day. Starting at the north, the small waste dump that can be seen is from the San Xavier copper oxide mine (map location 13); the next two prominent dumps are tailings piles and waste rock from the Mission mine operated by ASARCO (map location 14). The Pima Mining Co. tailings piles (covered with lush vegetation) is south of Mission. Twin Buttes tailings piles are next, separated by a deep V cut where the road leads to the surface plant of the Anamax Mining Co. (map location 15). The southernmost operations of the Esperanza and Sierrita mines (map location 16), owned by the Duval Corp., are not readily discernible from the highway. The architecturally lovely mission, San Xavier del Bac, which has been a place of worship for over 250 years, is a prominent tourist attraction visible just north of the series of mines.

13

14

15

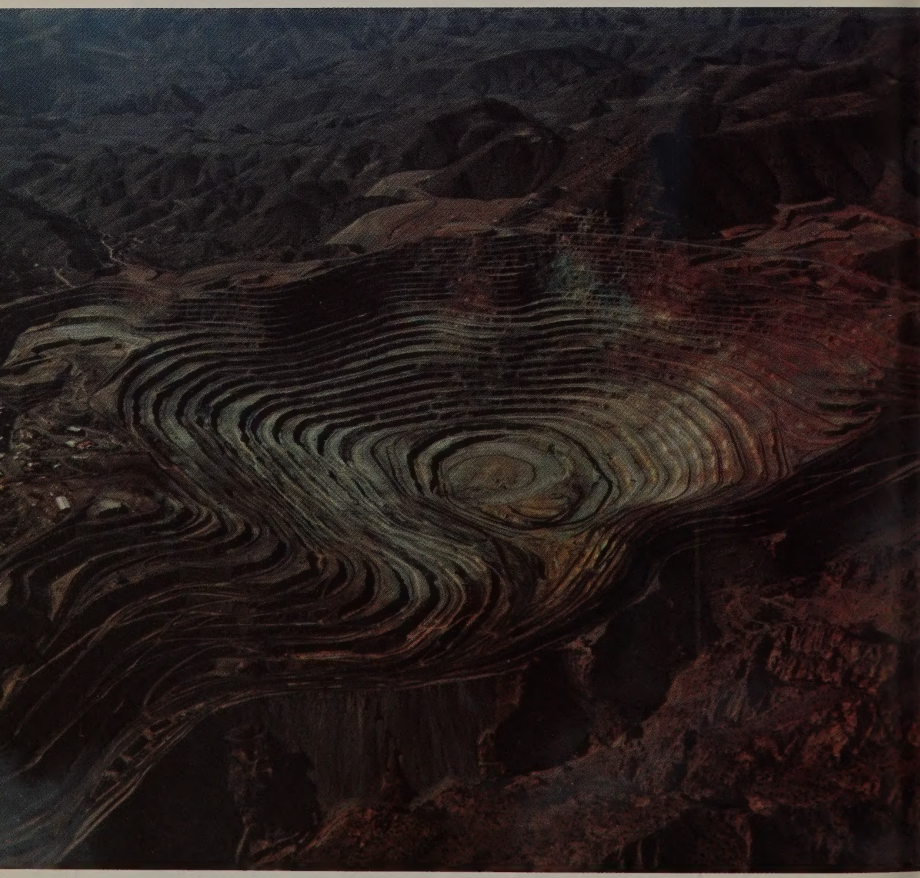
16

Ariz. 85, Ariz. 86.—Ajo is 15 miles from the Organ Pipe Cactus National Monument, which borders on the United States-Mexican boundary. (map location 17). Ajo is a quaint little Spanish-type town near the New Cornelia open pit, mill, and smelter of Phelps Dodge Corp.

17

U.S. 666.—In the eastern part of the State in Greenlee County, this highway passes along the Morenci
18 open pit mine, mill, and smelter of the Phelps Dodge Corp. (map location 18). This operation is one of the largest copper producing mines in Arizona. Adjacent to the Morenci mine on the east is the Metcalf property. This open pit mine is being developed and was ready for production in 1975; formerly several underground mines were worked in the same area.

Ariz. 97.—This road between Wickenburg and Kingman on U.S. 93 leads to Bagdad, where the Bagdad Div. of Cyprus Mines Corp. operates an open pit, sulfide concentration mill, oxide electrowinning plant,
19 and cement copper hydrogen reduction plant (map location 19). The company maintains an observation point for visitors. You must go through the town of Bagdad to the security gate. You will be given a pass to the observation point. The company usually has a good supply of copper-oxide ore pieces that you may take.



Morenci open pit copper mine of Phelps Dodge Corp.

MINES YOU CAN VISIT

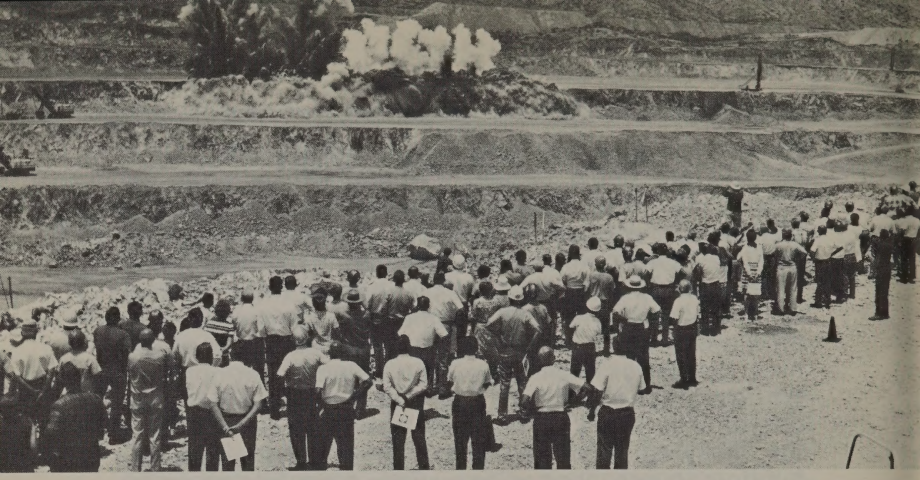
U.S. 60, U.S. 70.—The Inspiration Consolidated Copper Co. conducts free tours, Monday through Friday, at 12:45 p.m., of their operations at Inspiration (near Miami) 90 miles east of Phoenix (map location 2). The tour starts at the company's personnel office on the north side of the highway and east of the business district of Miami; the tour includes the open pit, vat leaching, electrowinning, smelter, and fabricating operations. The tour requires about 3 hours. This is the most complete operation in Arizona where the public can see copper operations from mining to the fabrication of 5/16-inch rod. Special group tours can be arranged for Saturday by contacting Public Relations, Inspiration Consolidated Copper Co., Inspiration, Ariz. 85537. 2

Ariz. 177.—The Ray Mines Div. of Kennecott Copper Corp. has provided a mine viewpoint 10 miles north of Kearny (map location 7). A taped message gives the description of the mining and ore-leaching procedures. 7

A tour of the ore reduction and smelter plants at Hayden is held on the last Thursday of each month at 10:00 a.m. (map location 8). The tour starts at the Kennecott Administration Building and lasts for 1½ to 2 hours. Do not confuse the Kennecott facilities at Hayden with the ASARCO smelting plant. 8

U.S. 666.—Phelps Dodge Corp. provides an observation area for the Morenci and Metcalf open pits adjacent to the highway. Tours can be arranged of the mine, mill, and smelter facilities (map location 18). Starting at Clifton and continuing northward, you encounter old and new views of mining environment. The highway passes in front of the Administration Building. Tours are held on operating days, except Sundays, beginning at 9:30 a.m. Prearrangement is advisable—write to the Manager, Morenci Branch, Phelps Dodge Corp., Morenci, Ariz. 85540. Children 9 years old or older may tour the operations, if accompanied by a parent or responsible adult. 18

U.S. 80, U.S. 666.—Tours are conducted through the smelter of Phelps Dodge Corp. at Douglas on Tuesday between 1 and 2 p.m. (map location 12). Arrangements should be made by contacting the smelter superintendent on weekdays between 8 a.m. and 4 p.m. For parties larger than 12, special arrangements must be made by written request at least 7 days in advance. Meeting place for tour visitors is the area immediately south of the large elevated water tank on the smelter property. Children 12 years old or older may tour the operation, if accompanied by a parent or responsible adult. Safety regulations 12



Group of visitors watching a blast at the Duval Corp. Sierrita mine near Green Valley, Ariz.

require the wearing of long-sleeved blouses, slacks, and flat-heeled shoes for the ladies, and long-sleeved shirts for the men. Safety hats and glasses will be provided.

U.S. 80.—A bus tour into the Lavender pit of the Phelps Dodge Corp. at Bisbee is available, Monday through Friday, starting at 12 noon from the viewpoint on U.S. 80. (map location 11). Preregistration is necessary and can be accomplished at the new Bisbee Chamber of Commerce Building at the viewpoint between 9 a.m. and 4 p.m. The tour lasts about 1 hour, and no walking is necessary. Special tours may be arranged by writing or telephoning the General Superintendent, Copper Queen Branch, Phelps Dodge Corp., Bisbee, Ariz. 85603 (telephone 432-3621). Mining at the Lavender pit terminated in late 1974, but the viewpoint has been maintained.

Ariz. 85, Ariz. 86.—The Phelps Dodge Corp.'s New Cornelia operation is at the town of Ajo in western Pima County (map location 17). Tours of the open pit, concentrator, and smelter can be arranged on operating days, except Sunday. Tour groups should be limited to not more than 40 people. Prearrangement is necessary and can be accomplished by writing or telephoning (602-387-7451) the Manager, Phelps Dodge Corp., New Cornelia Branch, Ajo, Ariz. 85321. Advance notice of a week is desirable. Children 8 years old or older may make the tour if accompanied by a parent or responsible adult. Tours that are to be completed by noon must be started at 9 a.m. A 10 a.m. starting time is permissible, if a lunch break is planned. Tours for smaller groups of casual visitors (not exceeding two car loads) are offered each Friday at 9 a.m. starting at the Employment Office. Persons interested in the Friday tour are asked to register beforehand at the Employment Office (telephone 387-7611).

Interstate 19, U.S. 89.—The Duval Corp. operates the Sierrita and Esperanza open pit properties about 27 miles south of Tucson and 5 miles west of Green Valley along the Duval Road (Interstate 19 exit) (map location 16). A tour of the Sierrita operation can be arranged for Saturdays at 9 a.m. by contacting the security guard at least 48 hours before the tour. This is one of the largest copper-molybdenum mines in the United States, with production between 220,000 and 250,000 tons of ore and waste per day. Mining features 150-ton diesel-electric trucks and 15-cubic-yard electric shovels. The tour requires about 2½ hours and includes a movie, a bus trip to the mine, and a walk through the concentrating plant. 16

Interstate 19, U.S. 89.—North of the Duval Road about one-half mile is the Twin Buttes mine of Anamax Mining Co., which is a venture of Anaconda Co. and American Metals Climax Corp. (map location 15). Tours of the Twin Buttes open pit and concentrator are held every Sunday at 11 a.m. and extending to 2 p.m.; no appointment is necessary. Special tours can be arranged for Tuesday by contacting Public Relations, Anamax Mining Co., P.O. Box 127, Sahuarita, Ariz. 85629, or by telephoning 623-4341. A viewpoint of the mine operation can be reached by driving west along the Duval mine road about 3 miles. A sign on the north side of the road directs you to the viewpoint. 15

GHOST TOWNS AND HISTORICAL SITES

U.S. Alt. 89.—The town of Jerome began with the discovery of the United Verde copper deposit in 1876 (map location 20). Major copper production continued from this area until 1940 from both underground and open pit mining. The open pit was started to provide material to extinguish a fire in the underground mine. 20

A small mining operation still exists whereby remnants of ore from the major operations are recovered. During World War I, Jerome had a population of 15,000. Today, the population is less than 1,000.

The Douglas Memorial Mining Museum is the main feature at Jerome State Historic Park. A tour of Jerome's old buildings on a steep hillside, the museum, and a view of one of the most interesting mining areas in Arizona, will prove rewarding to visitors.

U.S. 80.—Tombstone, "the town too tough to die," is a famous old silver mining camp and a frontier town (map location 21). At one time, Tombstone had a population of 15,000. The town was the site of the famous "shoot-out at the OK Corral" on October 26, 1881. The town was founded about 1879. High prices for silver in 1973 caused renewed mining interest at old 21

abandoned properties. The town has many interesting historical landmarks and tourist attractions.

U.S. 66.—Oatman, located about 26 miles north of Toprock on the old Kingman-Needles road (west of U.S. 66) was Arizona's premier gold mining area with a production valued at about $40 million prior to World War II; there has been virtually no gold mining here since (map location 22). The higher prices available for gold since 1972 have stimulated the search, and Oatman is receiving increased prospecting attention.

22

Two outstanding mineral collections, principally of Arizona minerals, are at the Geology Building (along North Drive) of the University of Arizona, Tucson, Ariz., and the Mineral Building, Arizona Department of Mineral Resources, Fairgrounds, 1126 West McDowell Road (near 19th Avenue), Phoenix, Ariz. These collections are open to the public weekdays between 8 a.m. and 5 p.m.

FOR MORE INFORMATION WRITE OR VISIT

Arizona Bureau of Mines, University of Arizona, Tucson, Ariz. 85721.

Arizona Department of Economic Planning and Development, 3003 North Central Avenue, Phoenix, Ariz. 85012.

Arizona Department of Mineral Resources, Mineral Building, Fairgrounds, Phoenix, Ariz. 85007.

Federal Bureau of Mines Liaison Office, 2721 North Central Avenue, Room 1012, Phoenix, Ariz. 85004.

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Rock to Riches: The Story of American Mining, Past, Present, and Future, as Reflected in the Colorful History of Mining in Arizona, the Nation's Greatest Bonanza, by C. H. Dunning and E. H. Peplow, Jr. Southwest Publishing Co., Phoenix, Ariz., 1959, 406 pp.

A lone prospector trudges across the high country.

COLORADO

by

Joseph B. Smith

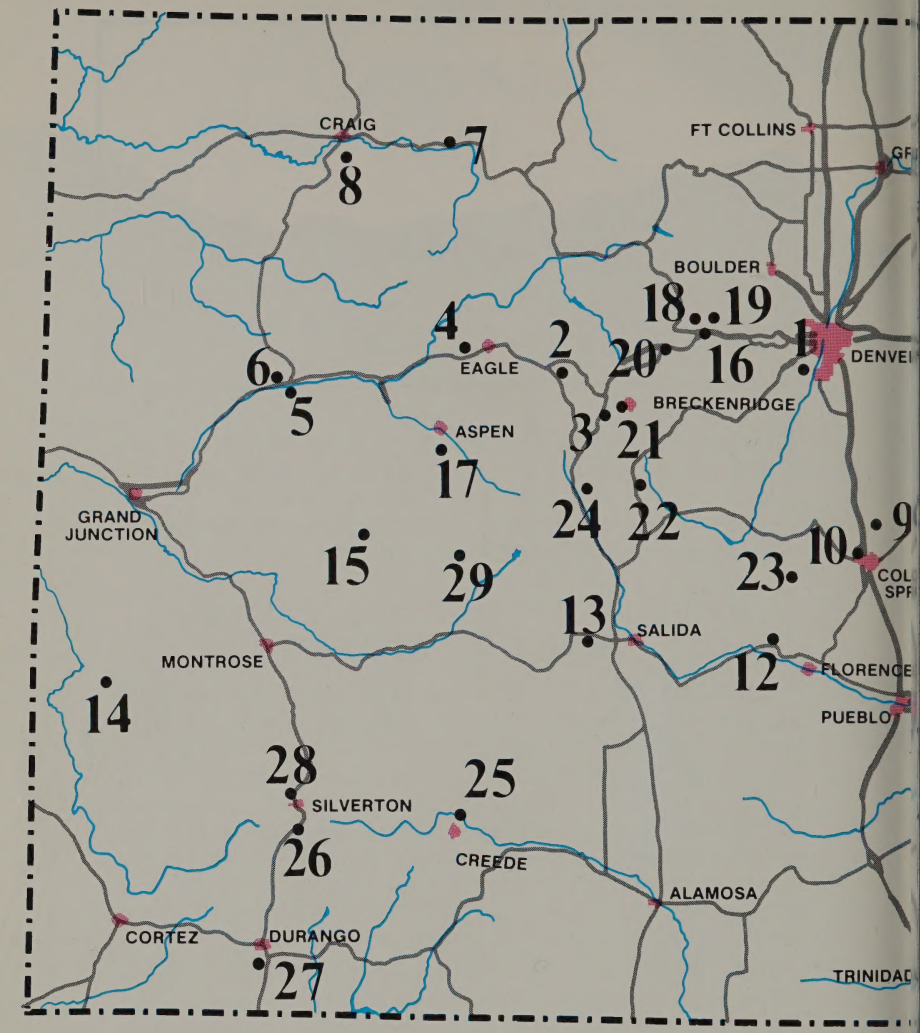
This chapter is for the visitor to Colorado interested in the fun of seeing new country and curious about mining activity old and new. As you view the old, do not be too harsh in your judgment of our pioneers, their work, their trails, dumps, and tunnels.

MINES AND PLANTS YOU CAN SEE FROM THE HIGHWAY

Interstate 70.—On the western edge of metropolitan Denver, the freeway passes through an impressive road cut in the "Dakota Hogback" (map location 1). Exit ramps to parking areas and signs for this point of geologic interest have been provided, and it is a most worthwhile stop. Black layers are clay beds that have been extensively mined along the hogback for many miles to the north and south for refractory clay. The open pit on the east slope of the Front Range, 2 miles northwest of the road cut, is a quarry for rock. 1

Colo. 24.—Few Colorado mines have had as long a continuous production history as the New Jersey Zinc Co. Eagle mine at Gilman, 6 miles south of Interstate 70 and 25 miles north of Leadville (map location 2). For more than 75 years, silver, copper, lead, and zinc has been mined in this canyon. Because the canyon walls are so steep and no room was available on the canyon floor, the mill was built underground in a large chamber cut from rock. 2

Colo. 91.—The old camp of Kokomo is barely noticeable as the road climbs past tailings piles from the American Metal Climax, Inc., molybdenum mining and milling operation on Bartlet Mountain. The Climax molybdenum mine is situated near Fremont Pass, 13 miles north of Leadville (map location 3). This is the world's largest primary molybdenum mine, and one of the world's largest mines in terms of underground production. Underground production is supplemented by open pit mining. The large tailing ponds to the north show you the gigantic scale of these operations 3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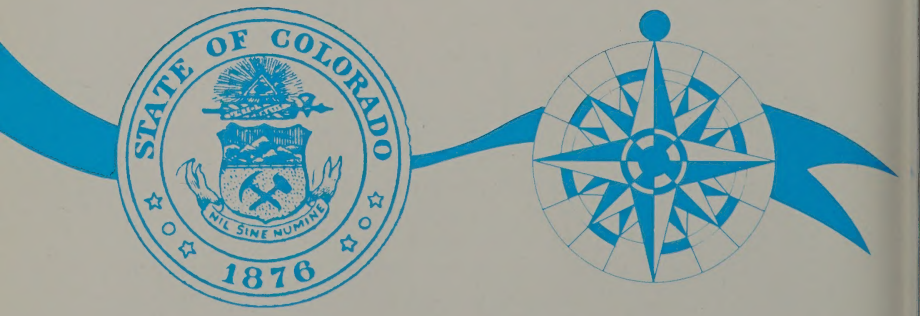
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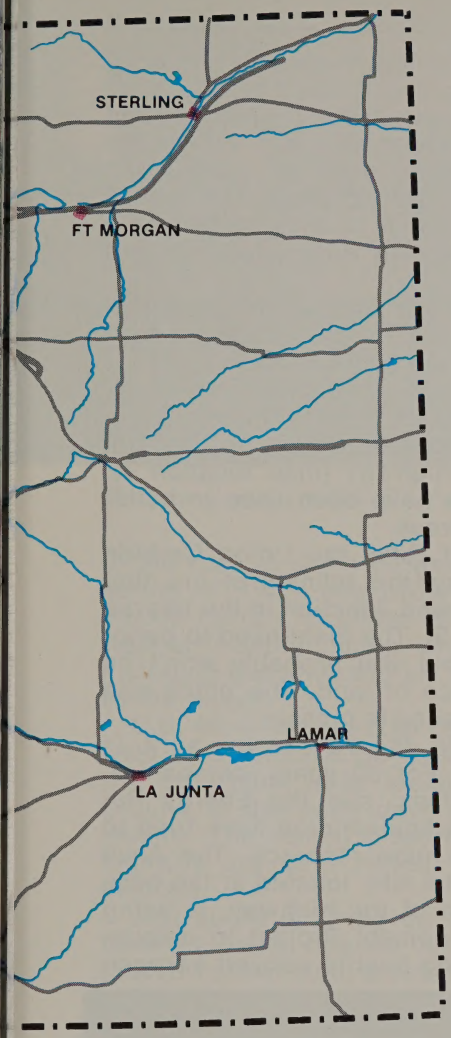


0 30 60 MILES

LEGEND

1— Dakota Hogback
2— Eagle mine
3— Climax mine
4— Dotsero Block cinder mine
5— Vanadium mill
6— Oil shale plant
7— Mt. Harris coal mine
8— Strip coal mine
9— Western mining museum
10— Rock quarry
11— Steel mill
12— Travertine quarry
13— Limestone quarry
14— Uranium country
15— Coal mines
16— Virginia canyon
17— Aspen
18— Central City-Blackhawk
19— Idaho Springs
20— Georgetown-Silver Plume
21— Breckenridge
22— Fairplay and gold dredge
23— Cripple Creek
24— Leadville
25— Creede
26— Silverton
27— Narrow-gage railroad
28— Telluride-Ouray
29— Crested Butte

with only 4 pounds of molybdenum available in each ton of ore. Molybdenum is primarily used to alloy steel and increase its strength, corrosion resistance, and abrasion resistance. Overburden and topsoil from the open pit operations are being used to reclaim and revegetate the inactive tailing pond areas. The Climax mine produces about 50 million pounds of molybdenum per year from an average daily production of 40,000 tons of ore.

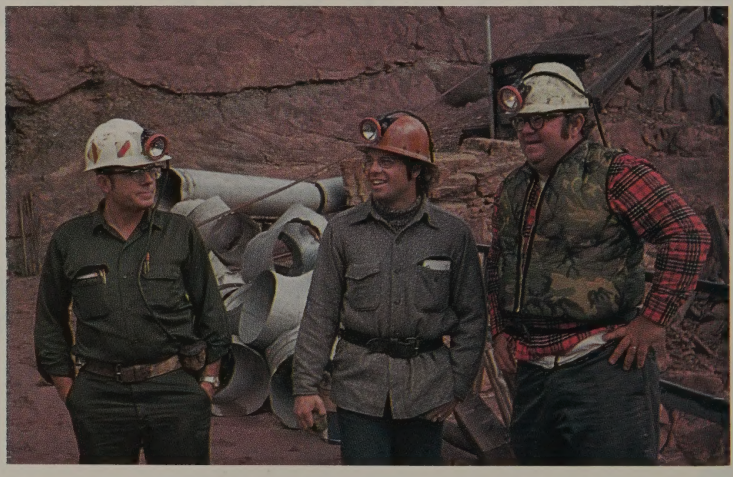
U.S. 24.—Between Eagle and Dotsero the road passes through a rough landscape of black, twisted rock that is a lava flow from a volcano. Reddish granular cinders also from the volcano can be seen in the valleys to the north. Here, Dotsero Block, Inc. mines the porous cinders to make concrete blocks in the plant on the north side of the highway (map location 4). Thousands of these blocks have been used in buildings at Vail and Aspen ski areas.

4

On the western edge of Rifle, the Union Carbide Co. vanadium plant finishes the refining of ore that was mined southwest of Grand Junction in the Uravan mineral belt (map location 5). The plant used to be located just east of town, but you probably won't be able to see any disturbance of land. The entire site has been reclaimed and seeded to grass.

5

A few miles west of Rifle, the view to the north is of high cliffs of oil shale. For 50 years, companies, the Federal Bureau of Mines, and the Energy Research and Development Administration have tried to unlock the energy of this huge resource. The Anvil Points oil shale experimental site, located at the base of the cliffs and just north of the highway, is being used by the Paraho Development Project to demonstrate their process for using heat to convert kerogen



Uravan miners stand before their mine workings just north of Uravan, Colo.

Hot metal at the CF&I Steel Corp. mill in Pueblo, Colo.

in the rock to shale oil (map location 6). In the early spring of 1975, this project produced and shipped 10,000 barrels of shale oil to the refinery at Fruita, west of Grand Junction, where a half dozen products, including gasoline and jet fuel, were made for testing by the Navy. 6

U.S. 40.—The old coal camp of Mt. Harris, 16 miles west of Steamboat Springs, is still the site of an active coal mine (map location 7). Mining was underground in the early days and now is done by strip mining. The rolling grass-covered hills south of the highway are strip mined lands that have been reclaimed. 7

Just south of Craig on Colo. 13 a new strip coal mine is being opened and will supply the nearby (called mine-mouth) powerplant (map location 8). 8

Interstate 25.—Just opposite the U.S. Air Force Academy is the newly founded Western Museum of Mining and Industry (map location 9). Take exit 71 *east* (northgate road), and signs will direct you to the museum. 9 Just north of Colorado Springs, the view to the west includes the Garden of the Gods in the sedimentary beds turned up against the granite mountains of the Front Range and a quarry for rock (map location 10). Bitter debate about this visual impact of the quarry has gone on for years, but the rock is needed for building in the city. Look carefully at the green slopes above the white quarry walls. That's the worked-out part of the quarry that has been reclaimed. 10 CF&I Steel Corp. plant is on the southern edge of Pueblo (map location 11). Iron ore from Wyoming, Utah, and New Mexico is combined with Colorado limestone and metallurgical (coking) coal to make rails, pipe, wire, and many other useful products. 11

U.S. 50.—A few miles north of Canon City can be seen the dumps and pits of an old travertine quarry (map location 12). The Monarch limestone quarry is operated by CF&I Steel Corp. 13 miles west of Salida and provides one of the ingredients for making steel at the company's plant in Pueblo (map location 13). Just west of the quarry you can visit the Madonna mine, where tours are conducted for a fee.

12

13

Colo. 141.—This highway passes through the Uravan mineral belt where first radium and then uranium and vanadium have been mined for more than 60 years (map location 14). Ore from mines in the belt is milled at Uravan. An intensive search for uranium ore, the rush of the late forties and early fifties, started here. Many modern day prospectors came; some made it, most did not. That mining rush was only 25 years ago.

14

Colo. 133.—Along the highway between Paonia and Somerset are several undergound coal mines (map location 15). Most of the coal is used for steelmaking.

15

MINES YOU CAN VISIT

Interstate 70.—At Idaho Springs pick up an information brochure for the Edgar (map location 16), an old silver-gold-lead mine now used by the Colorado School of Mines as an underground classroom. The mine has more than 4,000 feet of tunnel and other workings and is equipped with one-quarter of a million dollars worth of equipment. A museum of old mining machines is located at the mine. During the summer months, Wednesday to Saturday from 8:00 a.m. to 3:30 p.m., the school provides a *staff of guides* to conduct visitors through part of the workings and to demonstrate mining equipment. During the school year, tourists can visit the mine on Saturdays.

16

Colo. 91.—Thirteen miles north of Leadville on Colo. 91 is one of the world's largest mines, operated by the Climax Molybdenum Co. (map location 3). The company has an information center, and tours of part of the surface plant are provided during June, July, and August. There are no tours at the mine.

3

Other mines you would enjoy touring are the tourist mines that charge a small entrance fee. Most attempt to show mining as it was in the pioneer days. These tourist mines include the Couch Placer and the Bobtail at Blackhawk on Colo. 119; the Diamond Lil and The Glory Hole mines at Central City, just above Blackhawk; the Matchless mine on Fryer Hill above Leadville on U.S. 24 (Colo. 91); the Rutomipa on the northern edge of Ouray, U.S. 550; the El Paso on Beacon Hill in Cripple Creek, Colo. 67; and the Madonna mine, 13 miles west of Salida on U.S. 50.

GHOST TOWNS AND HISTORICAL SITES

Colorado has its share of ghost towns and, just as interesting, some very lively towns with ghost mines. World famous are Aspen (sking, music, old silver mines) and Central City (historic buildings, the Face on the Barroom Floor, old gold mines) (map location 17). There are many real ghost towns in areas so isolated that tourists need guides and special equipment to reach them. The following list is restricted to areas of historical mining interest that are on or near paved roads and from where local inquiry may be made regarding guided tours to remote ghost towns.

17

The surface plant at Climax atop the Continental Divide.

Colo. 119.—Site of some of the earliest hardrock gold mining, Central City and Blackhawk abound in remnants of past days (map location 18). Central City is the home of the Teller House, an 1878 opera house that features a summer program, numerous shops, and a mine tour. Central City was once known as the "richest square mile on earth." Its mine-scarred hills and the Victorian facade of its buildings attest to the role the city once played as an empire builder. The Gilpin Historical Museum is open from Memorial Day through Labor Day with displays of artifacts and equipment from the history-rich period 1859-1914.

18

Sister city of Central City, with millsite areas for many miles downstream, Blackhawk has been the scene of placer activity since the discovery of gold (map location 18). Just east of town, along Colo. 119, are tailings from placer gold workings. Most summers, some commercial mining is in evidence, and there are firms that invite the tourist, for a small fee, to pan gold.

18

Interstate 70.—Just east of Idaho Springs is the rusting hulk of the Argo mill where ore from Central City was processed for gold and silver (map location 19). Ore came to the mill through a 6-mile-long tunnel that goes under the high mountain above the mill and tapped the mine shafts at depths of 1,700 to 2,000 feet below the surface. One story goes, though unsupported by historical records, that during hard winters, when Central City had no school, children went down the shafts in the hoisting cages and rode the ore train through the tunnel to the Argo mill and thence to school in Idaho Springs. North of Idaho Springs, a steep gravel road ascends Virginia Canyon past many mines and descends through the mines of Russell Gulch to Central City. This is not a recommended tourist route—it's easier to take Colo. 119 and U.S. 6 that turns off the freeway 4 miles east of Idaho Springs.

19

Interstate 70.—Georgetown and Silver Plume contain more mines and mining reminders of past days when silver was king (map location 20). In Georgetown, visit the Hotel de Paris and museum. The Georgetown Loop, a railroad between the two towns, is being reconstructed, and the old steam trains are back in the yards.

20

Colo. 9.—Near Fairplay and Breckenridge, dredge tailings from gold mining are much in evidence (map location 21). Gold dredges are seldom used today in the United States, but a non-operating dredge can be seen in the distance east of U.S. 285 near Fairplay (map location 22). It has been shut down for years.

21

22

Colo. 67.—The Cripple Creek-Victor area is called the "world's greatest mining camp." The district was for a long time one of the big gold-producing camps of the United States (map location 23). Travelers can see the mines on almost every hillside. Jeep tours to nearby ghost towns are available. There is a museum at Cripple Creek, and mine tours are available.

23

U.S. 24.—The Leadville district produced the gold, silver, lead, and zinc that generated the fortunes of many of Colorado's early millionaires (map location 24). At present, exploration is continuing, and there has been limited production in recent years. Maps of the mining area keyed to numbered posts placed at the best known mines can be obtained locally. Tour-

24

The mines at Creede, Colo.

ists can visit the Matchless mine made famous by Baby Doe Tabor. For a small fee, the house from which she guarded the mine and the surface plant of the mine proper can be visited.

Colo. 149.—All around Creede are mine dumps (map location 25). left by inhabitants of one of Colorado's most lively early mining camps. Remember that line, "There's no night in Creede." It was busy then and still is. Silver is still being mined in the mountains west and north of town. 25

U.S. 550.—On the Million Dollar Highway from Ouray to Durango, Silverton is a famed mining and movie location (map location 26). You could leave your car in Durango and ride the oldtime narrow-gage railroad to Silverton (map location 27). 26 27

U.S. 50, Colo. 145.—These highways and Telluride and Ouray are separated by a high mountain range, but the mine workings of Idarado Mining Co. go from one side to the other (map location 28). The lead-zinc-silver mill is near Telluride on the western side of the range, but the supply depot and main surface plant are on the east, about 10 miles south of Ouray. Both highways share some of Colorado's most spectacular mountain scenery. Telluride is the most recent camp to be captured by the skiing industry. 28

29

Colo. 135.—Crested Butte is another turn of the century mining boomtown that is today a thriving mountain community (map location 29). Although some lead and silver mines are still operating, the boom this time is skiing. While you're in this area, don't miss the picturesque ghost towns of Gothic, Tincup, Pitkin, Ohio City, and the onetime rail center of Almont.

FOR MORE INFORMATION WRITE OR VISIT

Colorado Geological Survey, 1845 Sherman Street, Denver, Colo. 80203.

Colorado's Division of Mines, 1845 Sherman Street, Denver, Colo. 80203.

Intermountain Field Operation Center, Federal Bureau of Mines, Building 20, Denver Federal Center, Denver, Colo. 80225.

Federal Bureau of Mines Liaison Office, Building 20, Denver Federal Center, Denver, Colo. 80225.

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Colorado's Gold Regions and Mining Districts. Rusty's Maps, 7314 West 57th Avenue, Arvada, Colo. 80002.

Geological Highway Map of the Southern Rockies. American Association of Petroleum Geologists, U.S. Geological Highway Map Series, Map 2.

Historic Central City. Central City Business Association, P.O. Box 4, Central City, Colo. 80427.

Mining Energy and Rocks in Colorado. Bureau of Land Management, Colorado State Office, Colorado State Bank Building, 1600 Broadway, Denver, Colo. 80202.

Prairie, Peak and Plateau. Colorado Geological Survey, 1845 Sherman Street, Denver, Colo. 80203.

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Stampede to Timberline, by M. S. Wolle, Boulder, Colo., 1949, 544 pp.

IDAHO

by

Lawrence E. Davis

Idaho is properly known as the Gem State. As a tourist attraction, recreation mining is beginning to receive considerable attention. The State's diverse geology and rock-revealing mountainous terrain make it appealing to rockhounds, especially those willing to leave the beaten path in search of unusual mineral specimens. A U.S. Forest Service campground serves the Federally owned Emerald Creek star-garnet deposit on Emerald Creek near Clarkia on Idaho 43 (map location 1). Twenty minutes off Interstate 15 from Spencer are two deposits of precious opal where the gem can be dug, for a fee, June through September (map location 2). Quality jasper can be found in Bruneau Canyon, Owyhee County (map location 3). The Clearwater River Valley is one of the few collecting localities in the world for gem-quality sillimanite (fibrolite) (map location 4). Diligent effort at the Dismal Swamp placer, Elmore County, could yield specimens of topaz (map location 5). Also, various guidebooks published for the benefit of mineral collectors are available at most "rock shops."

1 2 3 4 5

Idaho is rich in both historic mining interest and current mineral industry attractions. The Coeur d'Alene mining area produces nearly half the silver mined in the United States. The richness of these mines makes Idaho the first ranking antimony producer and the second nationally in lead production. The output from phosphate deposits in southeastern Idaho places the State second in phosphate and third in vanadium among the producing States.

MINES AND PLANTS YOU CAN SEE FROM THE HIGHWAYS

A number of mining operations that are significant to the economy of the State, but are not equipped to handle visitors, are located near Federal and State highways in Idaho.

U.S. 93.—The Clayton silver mine near Clayton,

GREAT SEAL OF THE STATE OF IDAHO
ESTO PERPETUA
SANDPOINT
COEUR D'ALENE
KELLOGG
MOSCOW
LEWISTON
GRANGEVILLE
SALMON
PAYETTE
BOISE
NAMPA
IDAHO CITY
SUN VALLEY
MOUNTAIN HOME
BURLEY
MALAD CITY
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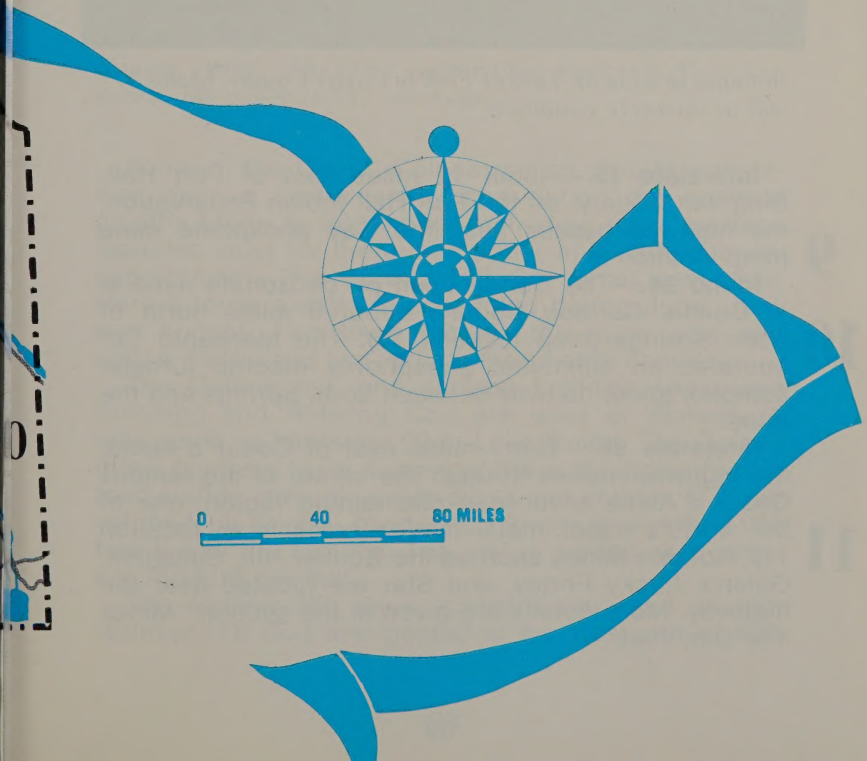
LEGEND

1— Star-garnet deposit
2— Precious opal deposits
3— Jasper deposit
4— Sillimanite deposit
5— Topaz deposit
6— Clayton silver mine
7— Empire copper-gold-silver mine
8— Garnet processing plants
9— Gay phosphate mine
10— Conda open pit phosphate mine
11— Coeur d'Alene silver-lead-zinc mining region
12— Murray ghost town
13— Pierce ghost town
14— Warren ghost town
15— Leesburg ghost gold camp
16— Bonanza ghost town and museum
17— Idaho City ghost town
18— Atlanta ghost town
19— Silver City ghost town and museum
20— Historic charcoal kilns
21— Historic Nicholia smelter



6 Custer County, may be seen from the Salmon River Highway (map location 6).

Alt. U.S. 93.—The Empire mine (copper-gold-silver) is located in Custer County at Mackay, about 24 miles north of Arco in the Big Lost River Valley (map location 7).

7

Idaho 3.—At Fernwood, and between Fernwood and Clarkia, Benewah County, are plants processing locally mined garnet, principally for use as an abrasive material (map location 8).

8

Bonanza dredge on Yankee Fork in Custer County, Idaho, is still in operable condition.

Interstate 15.—About 12 miles east of Fort Hall, Bingham County, on the Fort Hall Indian Reservation, the highway passes near the Gay phosphate mine (map location 9).

9

Idaho 34.—The Conda open pit phosphate mine is at Conda, Caribou County, about 9 miles north of Soda Springs (map location 10). The Monsanto Co. operates an elemental phosphorus electric furnace complex about halfway between Soda Springs and the mine.

10

Interstate 90.—Thirty miles east of Coeur d'Alene, the highway passes through the center of the famous Coeur d'Alene silver-lead-zinc mining region, one of the world's major metal mining areas (map location 11). Notable mines such as the Bunker Hill, Sunshine, Galena, Lucky Friday, and Star are located near the highway. More details are given in the section "Mines You Can Visit."

11

MINES YOU CAN VISIT

Along Interstate 90 in the Coeur d'Alene district there are marked turnoffs to individual mines, and occasionally a mine shaft headframe, mine dump, or mill tailings pond can be seen (map location 11). A side trip up the secondary road from Wallace to Burke brings even closer the current mining operations and some of the great mines of the district that are now closed down.

11

Charcoal kilns that operated from 1885 to 1889 in Lemhi County, Idaho. The kilns supplied the smelter at Nicholia across the valley to the northeast.

Some of the Coeur d'Alene mining district companies have a visitor policy and during the summer months (June to September) schedule tours (surface facilities only) for the public either at set times or by appointment. The Bunker Hill Co. is an exception. Here 4 tours a day are scheduled during June, July, and August. Two tours include the mine area and concentrator, and two include the smelter complex.

The Galena mill and surface facilities (American Smelting and Refining Co.) are west of Wallace, 1 mile south of Interstate 90 in Lake Gulch. The Galena mine, contrary to its name (galena is the name for the lead sulfide mineral) yields silver and copper. It is developed by several production levels to nearly 4,000 feet below the surface. The mill is equipped to process 750 tons per day.

The Bunker Hill mine, concentrator, and smelter (Bunker Hill Co.) are located at the west end of Kel-

logg (Smelterville) on Interstate 90. Access to the mine is through a 2½ miles, adit known as the Kellogg Tunnel. The mine has reached a depth of 1 mile, about 1,600 feet below sea level. Drifts and crosscuts on the various levels have a combined length in excess of 100 miles. To date, the mine has yielded more than 30 million tons of ore. The concentrator processes 2,100 tons of ore per day.

The Lucky Friday mill (Hecla Mining Co.) is situated 1 mile east of Mullan on Interstate 90. The mill is designated to treat 600 tons of silver-lead-zinc ore a day and yields a zinc and lead concentrate. The grade of ore processed by the mill averages about 14 ounces of silver per ton, 10 percent lead, and 1 percent zinc.

The Sunshine mine (Sunshine Mining Co.), the Nation's largest silver producer, is located on Big Creek, 3½ miles east of Kellogg and 2 miles south of Interstate 90. The mine differs from most mines in the district in having a high-grade irregular ore deposit; that is, it does not have a continuous vein structure. The erractic nature of the ore requires more driving of steep or vertical passageways for the tonnage extracted and requires longer horizontal openings for the tonnage developed than all but one other major mine in the area. The mine production to date exceeds 8 million tons. Presently the concentrator treats about 725 to 750 tons of ore per day. In addition to the silver production, the mine has yielded nearly 3 million pounds of copper and over 1.5 million pounds of antimony.

The Star mine and mill (Hecla Mining Co.) is in the town of Burke, about 4 miles east of Wallace on Idaho 4. The ore body, a vertical vein-type, is the deepest zinc ore body being mined in the United States, possibly the deepest active mine, and has been continuous from the outcropping. Present mining is conducted at the 7600-foot level, about 1,800 feet below sea level. It is primarily a zinc-lead mine; the zinc mineral is sphalerite and the lead mineral is galena. Since its inception in 1925, the Star mine has yielded over 7½ million tons of ore. Currently, the mill treats 825 tons of ore per day averaging 7.5 percent zinc, 5 percent lead, and about 3 ounces of silver per ton.

While in the Coeur d'Alene mining district a visit to the Wallace mining museum, next to the Chamber of Commerce office, is a must. It has been fitted with a dark room and projector to give visitors a simulated underground mine tour.

GHOST TOWNS AND HISTORICAL SITES

Discovery of gold at Pierce and in the Boise Basin more than century ago has been followed by pros-

pecting and development which has resulted in commercial production of gold, silver, copper, lead, or zinc from at least 40 of Idaho's 44 counties. Many other metals have been produced, notably antimony, cobalt, tungsten, and vanadium. The ghost towns and historical sites, most of which are associated with old mining camps, are too numerous to mention, but a great number of them are clearly marked on the Idaho highway maps issued by the various oil companies.

Some of the more interesting are the following: (1) Murray ghost town, north of Wallace off Interstate 90 (map location 12), (2) Pierce (map location 13), (3) Warren ghost town, where gold was first discovered in Idaho in 1860 (map location 14), (4) Leesburg gold camp from 1866, northeast of McCall off Idaho 55 (map location 15), (5) Bonanza ghost town and museum, east of Salmon off U.S. 90 (map location 16), (6) Idaho City ghost town, north of Sunbeam off U.S. 93 (map location 17), (7) Rocky Bar and Atlanta ghost towns on Idaho 21 (map location 18), (8) Silver City ghost town, southwest of Mountain Home off Idaho 68 (map location 19), (9) historic charcoal kilns are located in Birch Valley Creek off Idaho 28 (map location 20) which supplied the Old Nicholia smelter active from 1885 to 1889 (map location 21).

Travelers are advised to obtain some of the publications listed and make local inquiries on road conditions off major highways.

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FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, Room 203, 4620 Overland Road, Boise, Idaho 83705.

Idaho Bureau of Mines and Geology, Mines Building, University of Idaho, Moscow Idaho 83843.

Idaho State Historical Society, 325 West State Street, Boise, Idaho 83702.

Idaho Gem Club, Inc., P.O. Box 7521, Boise, Idaho 83707.

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Warren, Idaho, a little village tucked away in the Idaho Wilderness Area in the central part of the State, is accessible only by U.S. Forest Service roads. It is pictured as it appeared in the 1800's; many of the old buildings still remain today. (Courtesy of Idaho Department of Commerce and Development.)

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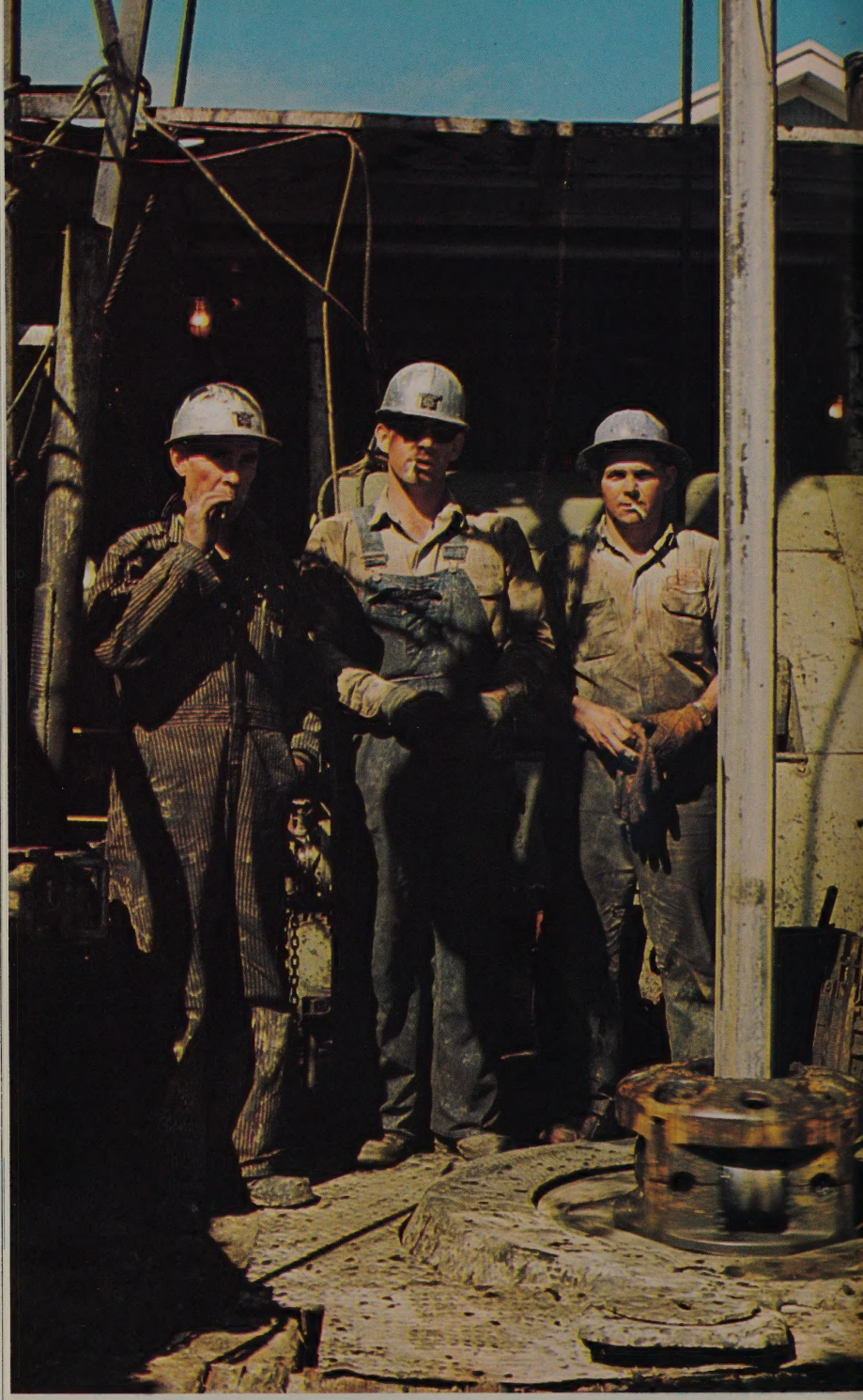


An exploration drill team at Butte, Mont.
(Courtesy of Anaconda Co.)

MONTANA

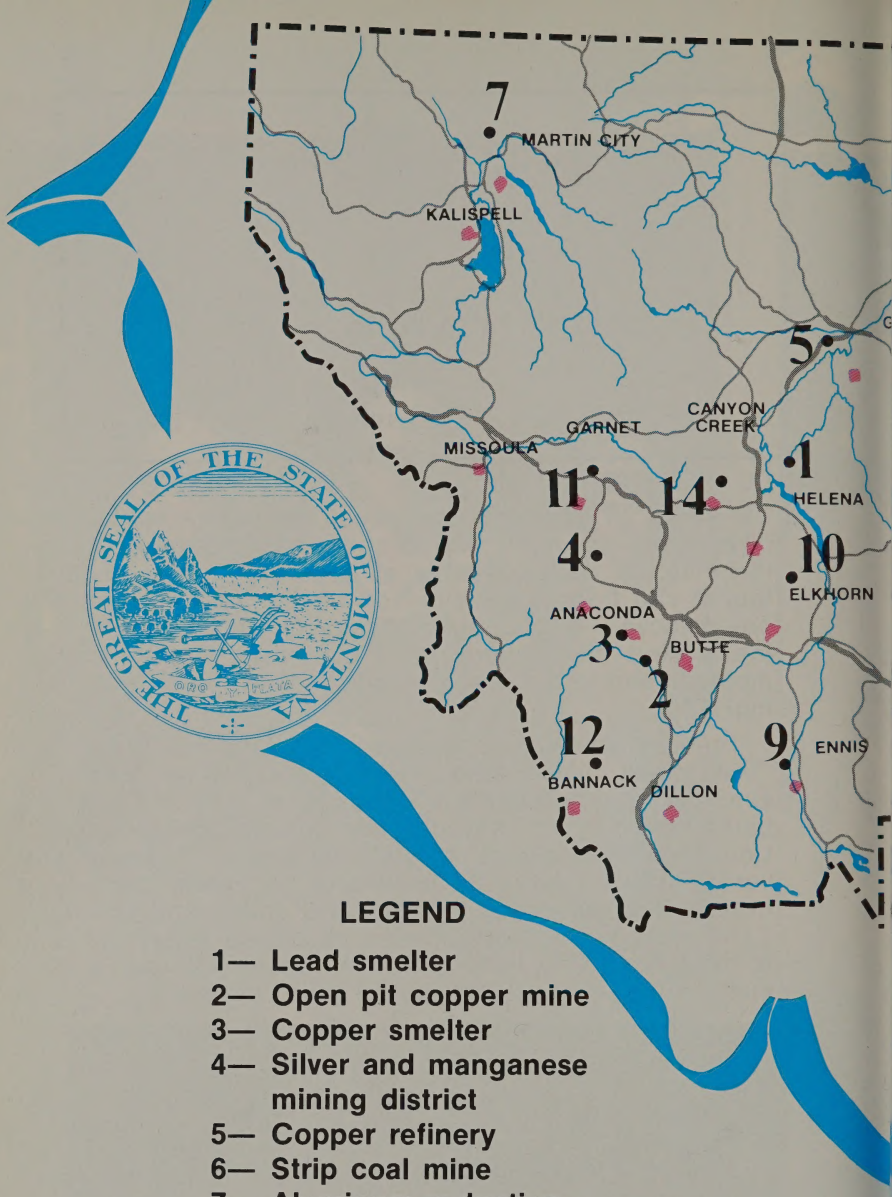
by

George T. Krempasky

Visitors to Montana can recall the early mining days, which put many a town and area of Montana on the map, by visiting scores of deserted camps. The tourist can trace the history of mining from the first pay discovery of gold and subsequent placer finds to the mining of rich ore by underground extraction methods and to the present large-scale open pit mining.

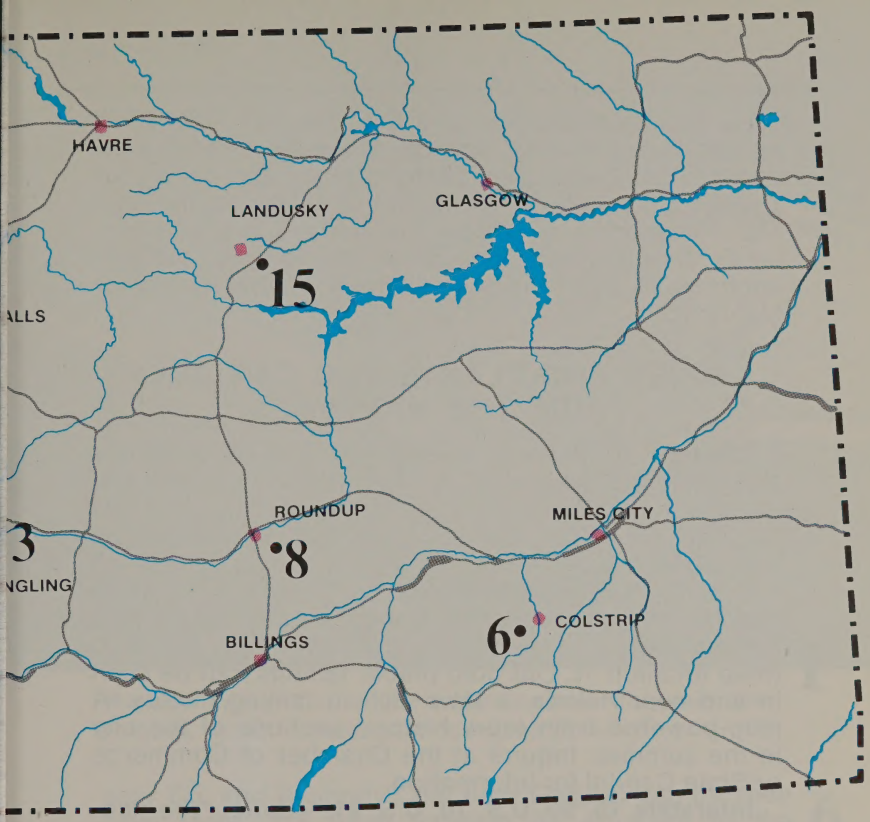
The best known mining area in Montana is Butte—"the richest hill on earth." Gold, silver, copper, lead, zinc, and other nonferrous metals have been and are being mined by underground and surface operations. Underground workings in Butte exceed 40 miles of vertical shafts, over 2,500 miles of horizontal openings (drifts, crosscuts, laterals, and adits), and over 7,500 miles in the stoping areas (openings where ore is extracted). This labyrinth of the Butte Hill has resulted in the extraction of over $4 billion of metals.

Headframe at Butte, Mont. (Courtesy of Anaconda Co.)



LEGEND

1— Lead smelter
2— Open pit copper mine
3— Copper smelter
4— Silver and manganese mining district
5— Copper refinery
6— Strip coal mine
7— Aluminum reduction work
8— Coal mining district
9— Reconstructed gold mining camps
10— Historic mining camp
11— Historic mining camp
12— Historic western town
13— Historic mining district
14— Historic mining district
15— Historic gold mining camp


HAVRE
LANDUSKY
GLASGOW
15
ROUNDUP
MILES CITY
8
BILLINGS
6
COLSTRIP
0
40
80 MILES

Ferrous, nonmetallics, and fuel minerals have been produced in Montana, and the areas from which production has come also contributed to the history of Montana. Coal, the chief source of power for industry and transportation during the early years of Montana's development as a State, has played and will continue to play a significant role in the history of Montana.

MINES AND PLANTS YOU CAN SEE FROM THE HIGHWAYS

Western Montana is dotted with old mine dumps and workings, and in many parts of the northern and eastern sections, oil wells, pumping stations, refineries, strip mines for coal, and coal-fired electric generator plants can be seen.

U.S. 12, U.S. 91, Interstate 15.—American Smelting and Refining Co. operates a lead smelter and a slag fuming plant at East Helena to recover lead and zinc (map location 1). Old gold placer tailings can be seen in and near Helena, a town rich in mining history. A jeep-powered train tours historic sections of the city in the summer. Inquire at the Chamber of Commerce or State Capitol for information.

1

Interstate 15, 90, U.S. 10, U.S. 91.—Butte, "the richest hill on earth," has a distinct grandeur (map location 2). It is a mining camp that has met many tests, and slim vestiges of the so-called golden age are still present.

2

At Butte, one who is interested in mining can watch open pit mining activities from an observation platform at the edge of the Berkeley pit. Other points of interest to the general public are the World Museum of Mining and the Montana College of Mineral Science and Technology.

Alt. U.S. 10.—The Anaconda Co. metallurgical complex at Anaconda can be toured on weekdays during the summer months (map location 3). Ores smelted at this plant are primarily from the Butte mining district. Continuing on north, Alt. U.S. 10 passes through Philipsburg, rich in mining history (map location 4). The findings of silver nearly 100 years ago and the subsequent mining of silver deposits and the more recent mining of manganese ores have played an important role in the development of the area. Evidence of mining activities can be seen from the road.

3

4

U.S. 89, U.S. 91, U.S. 87, Interstate 15.—At Great Falls, the copper that was mined in the Butte area and smelted at the metallurgical complex at Anaconda is further processed at the Great Falls plant of the Anaconda Co. (map location 5).

5

Mont. 315.—Strip mining operations of Western En-

Western Energy Co. mining a 23-foot-thick coal seam near Colstrip, Mont. (Courtesy of Montana Power Co.)

ergy Co. and Peabody Coal near Colstrip can be seen from Mont. 315 (map location 6). Adjacent to the Western Energys' mine operation, mine-mouth steam generating plants will produce electricity to be used in Montana and the Pacific Northwest. 6

MINES YOU CAN VISIT

Butte.—Underground tours of the Butte copper mines begin in June, and are conducted Monday through Friday at 9:00 a.m. and 1:00 p.m. (map location 2). The tour is limited to 24 persons, and no one under 19 years of age is permitted. Arrangements must be made in advance at the Butte Chamber of Commerce in the Finlen Hotel. 2

A viewing booth at the edge of Berkeley pit is provided by the Anaconda Co. for the interested observer. The large low-grade copper open pit is one of the largest truck mining operations in the world. Ore production amounts to about 50,000 tons per day with about four times that amount of waste being moved. The copper recovered from a ton of ore is approximately 12 pounds. Brochures, which presents data on this and other mines, are provided at the booth.

The Montana College of Mineral Science and Technology has a world-famous mineral museum. This museum contains a vast collection of minerals from all over the world and is open from 8:00 a.m. to 5:00 p.m.

The World Museum of Mining is adjacent to the campus of Montana College of Mineral Science and Technology. It includes the Orphan Girl mine headframe and hoist house and contains a fine collection of relics of early mining. In addition, a replica of a main street of an early mining camp, "Hell Roarin' Gulch"—with its general store, assay office, saloon, drugstore, and soda fountain—offers many exhibits of yesteryear that are of interest to all ages.

Anaconda.—Tours of the metallurgical complex at Anaconda run from June through Labor Day, leaving at 9:45 a.m. and 1:15 p.m. except Sundays and holidays (map location 3). No advance arrangements are necessary for the tour; persons desiring to make the tour should report to the gatehouse of the plant.

3

U.S. 2, Columbia Falls.—The aluminum reduction works of Anaconda Aluminum Co. can be visited. This location was selected because of the availability of low-cost hydroelectric energy (map location 7).

7

Interstate 15, U.S. 87, U.S. 91.—Copper is the main product of the Anaconda Co. electrolytic refinery near Great Falls (map location 5). Tours of the refinery and wire mills are conducted on weekends. Contact the Great Falls Chamber of Commerce for information.

5

U.S. 12, U.S. 87.—The mines and tipples seen in the vicinity of Roundup produce bituminous coal (map location 8).

8

Mont. 38.—For a fee, rockhounds can search for Rock Creek sapphires at a placer site about 18 miles west of Phillipsburg (map location 4).

4

Watering down haul roads at the Berkeley pit. (Courtesy of Anaconda Co.)

GHOST TOWNS AND HISTORICAL SITES

Montana's scores of ghost towns and deserted mining camps are scattered through the rough high country in the western part of the State. Many of the towns are abandoned; a few families still eke out a living in some. The Montana Ghost Town Preservation Society, a non-profit organization, was founded in 1971 to preserve and, if possible, to renovate some of the early mining camps to their original atmosphere.

Mont. 287.—Two of the State's famous gold mining camps, Nevada City and Virginia City, located side by side on Mont. 287. (about 15 miles west of Ennis), have been rebuilt (map location 9). These camps, visited by many tourists, are authentic and show much of the mining history of southwestern Montana. 9

Interstate 15, U.S. 91, Interstate 90.—Restoration efforts, undertaken to make the historical mining camps a living museum to commemorate the establishment of the early West, are being implemented at Elkhorn, off Interstate 15, U.S. 91, and at Garnet, off Interstate 90 (map location 10-11). 10 11

Mont. 278.—Bannack, the site of Montana's first territorial capitol and the first jail in Montana, is 20 miles west of Dillon on Mont. 278 (map location 12). Visitors can recall the exploits of a moonlighting sheriff, who headed a band of road agents. 12

Mont. 294.—Castle, the site of active mining operations prior to 1891, is about 10 miles southeast of White Sulphur Springs (map location 13). 13

Interstate 15.—Eighteen miles northwest of Helena is Marysville (map location 14). Wealth produced from this area helped to build St. Helena's Cathedral in Helena. 14

U.S. 10A.—Granite, a historic mining town associated with Granite bimetallic mine, is about 4 miles east of Phillipsburg (map location 4). Remnants of early day mining still exist. 4

U.S. 191.—Zortman and Landusky in the Little Rockies, a gold mining camp of yesteryear, was also used by Kid Curry and the "Wild Bunch" as a hideout during the early days (map location 15). 15

There are other ghost camps in Montana—usually remote—that may be of interest. Inquire locally for directions.

FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, 636 North Logan, Helena, Mont. 59601.

Montana Bureau of Mines and Geology, Montana School of Mines, Butte, Mont. 59701.

Montana Historical Society, Helena, Mont. 59601.
Montana Ghost Town Preservation Society, Box 607, Bozeman, Mont. 59715.

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Cattle grazing on reclaimed land near Colstrip, Mont.; a coal tipple is in the background. (Courtesy of Montana Power Co.)

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Lamoile Canyon in the Ruby Mountains, Elko County, Nev.

NEVADA

by

Paul V. Fillo

The history of Nevada and the development of its industry, economic growth, culture, tourism, and many recreational attractions have evolved around the State's leading basic industry—mining.

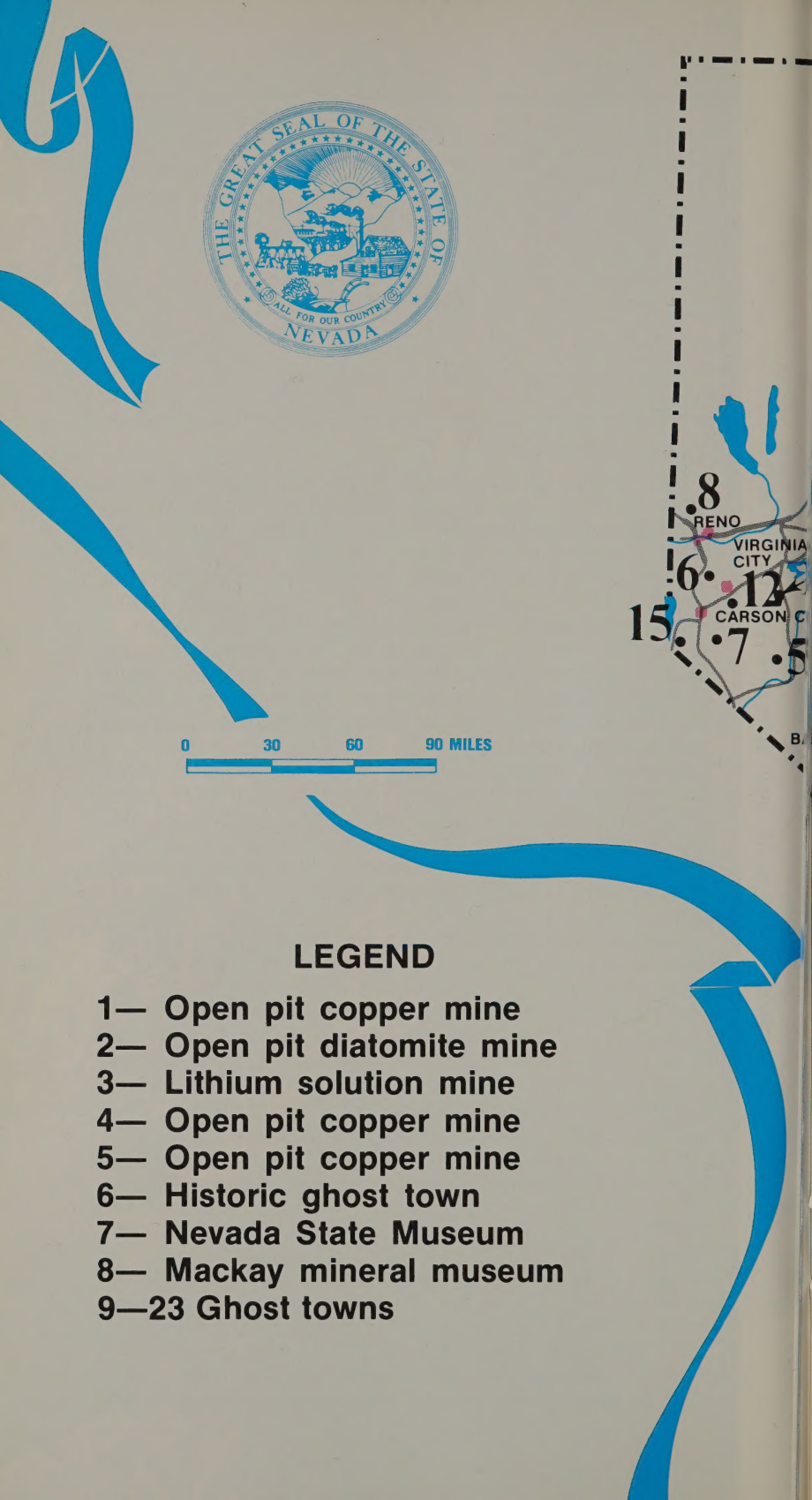
Today's mining industry, however, is a considerable contrast to mining of the mid-1800's and early 1900's when Nevada's dramatic rise to mining fame began. A lucky strike in rich ore could result in a single fortune for the rugged prospector of a century ago; the thrills of modern corporate mining operations come through the application and results of latest scientific methods and technology.

Nevada's mining industry has played vital roles throughout national history from the Civil War days, when the Comstock Lode mines helped finance the Union, to present day productions of silver, gold, mercury, tungsten, copper, iron ore, and other minerals vital to our Nation's manufacturing and energy requirements.

Copper and gold are, and will continue to be, the State's leading mineral products. Also, there is a great potential for development of nonmetallic resources in Nevada such as diatomite and barite.

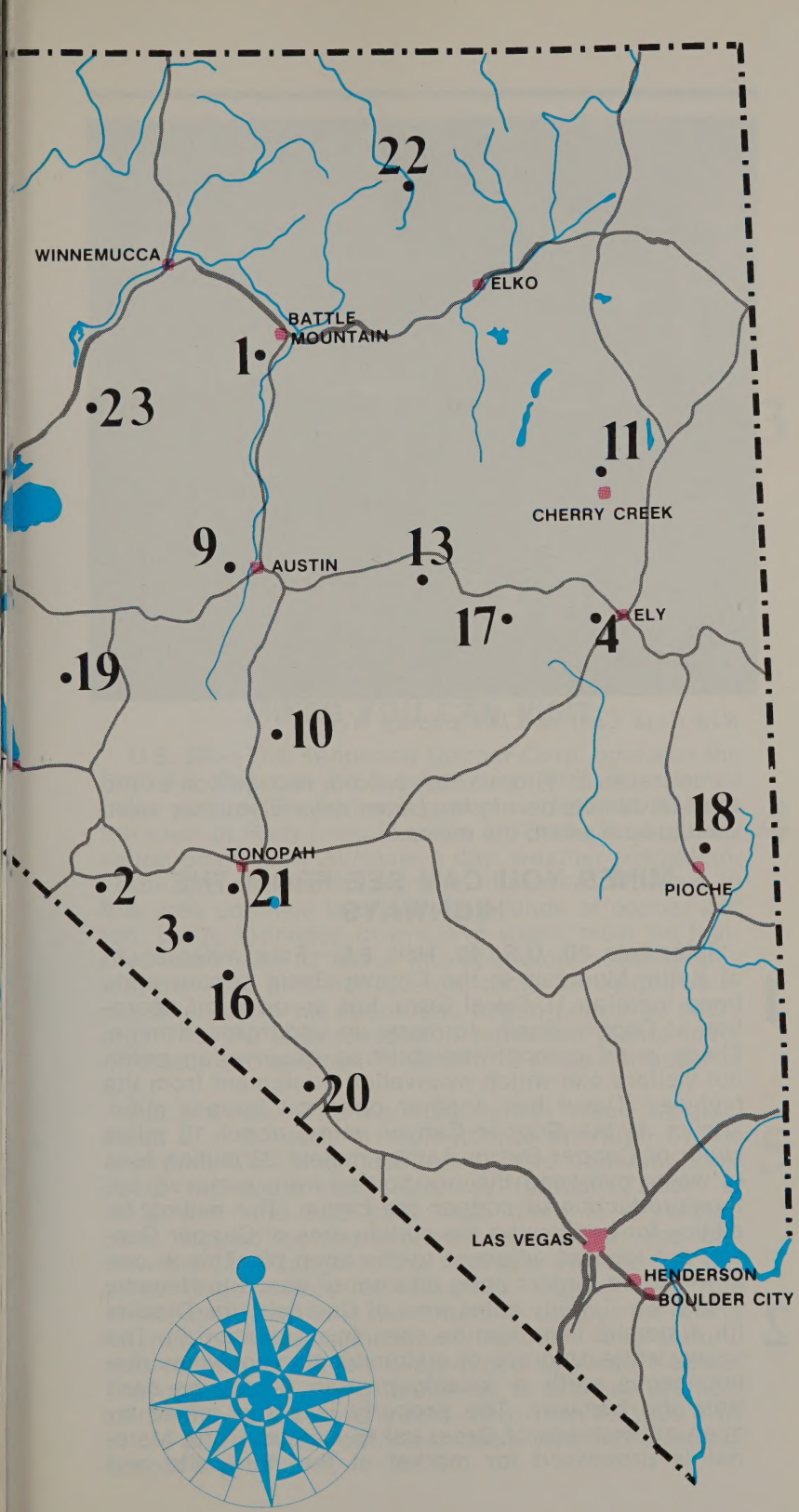
Throughout the State, there are several organizations performing research in mining and minerals explorations. The Federal Bureau of Mines has a metallurgy research center located at Reno. The Mackay School of Mines at the University of Nevada in Reno and associate organizations, the Nevada Bureau of Mines and Geology and the Nevada Mining Analytical Laboratory, form the State's education, research, and public service center for the minerals industry.

Several recreational activities throughout Nevada relate to mining, minerals and geology. There are areas of great interest to rockhounds, archaeologists, and historians. There are many annual events that provide reminiscent good times for Nevadans and tourists such as the mining contests in Gabbs and the



LEGEND

1— Open pit copper mine
2— Open pit diatomite mine
3— Lithium solution mine
4— Open pit copper mine
5— Open pit copper mine
6— Historic ghost town
7— Nevada State Museum
8— Mackay mineral museum
9—23 Ghost towns


22
WINNEMUCCA
ELKO
BATTLE MOUNTAIN
1
23
11
CHERRY CREEK
9
AUSTIN
13
17
ELY
4
19
10
18
TONOPAH
2
21
PIOCHE
3
16
20
LAS VEGAS
HENDERSON
BOULDER CITY

Red Rock Canyon, Clark County, Nev.

camel races in Virginia City held in recognition of the work of camels during the boom days when they were used to haul salt to the mines.

MINES YOU CAN SEE FROM THE HIGHWAYS

Interstate 80, U.S. 40, Nev. 8A.—Four miles south of Battle Mountain is the Copper Basin copper mine (map location 1). Duval Corp. has an open pit operation at Copper Basin, formerly an underground mine. There is no company-established observation point, but visitors can watch excavation equipment from the highway. Duval has another open pit copper mine, known as the Copper Canyon mine, about 10 miles south of Copper Basin. Approximately 23 million tons of waste overlying the ore bodies were removed before production of copper ore began. The milling facilities for processing the sulfide ores of Copper Canyon are located adjacent to the open pit. This is one of the three largest open pit copper mines in Nevada.

1

U.S. 6.—Twenty miles west of Coaldale, the Dicalite Pit diatomite mine can be seen (map location 2). The snowy white outcrops of diatomite, also known as diatomaceous earth or kieselguhr, can readily be seen from the highway. The property is being mined by open pit methods of Great Lakes Carbon Corp. Material is processed for market at the mine site and

2

transported in huge trucks and trailers to Mina for shipment by rail. Diatomite is almost entirely made up of the fossil remains of diatoms, which are microscopic organisms belonging to the vegetable kingdom, that were deposited in a marine environment. It is used for a wide variety of purposes, one of the most important being as a filtering agent for sugar liquor and alcoholic and nonalcoholic beverages. Because of its gentle abrasive action, diatomite forms the base of many automobile polishes.

Nev. 47.—The Clayton Valley Salt Marsh lithium mine is located about 2 miles east of Silver Peak (map location 3). Foote Mineral Co. has developed an extensive brine deposit east of Silver Peak. Company officials state that the brines are six to seven times richer in lithium values than any presently known domestic brine source. Potassium, rubidium, and other coproducts may be recovered at a later date. No observation points are available, but the company's 45 wells and 6 ponds, ranging from 500 acres to 1,500 acres in size, can be seen from Silver Peak. 3

MINES YOU CAN VISIT

U.S. 50.—The Kennecott Copper Corp. operates the Ruth Pit that can be reached from U.S. 50 about 4 miles west of Ely by turning west on Nev. 44 through the town of Ruth (map location 4). There is an observation point open 24 hours a day, weather permitting. There are directional signs to the area. The ore in this area contains less than 16 pounds of copper per ton. Large tonnages of ore and waste must be handled each day to make the operation economically feasible. The area has been a center of copper mining since open pit operations began nearly 60 years ago. The ore is processed in reduction plants (concentrator and smelter) at McGill, 13 miles northeast of Ely. 4

Alt. U.S. 95.—The Yerington pit at Weed Heights, about 2 miles west of Yerington, is operated by the Anaconda Co. (map location 5). The company conducts two tours daily, Monday through Friday, at 10:30 a.m. and 2:30 p.m. Also, there is a vantage point located on the property from which you can view the pit. Alongside the highway, visitors can observe large dumps of low-grade copper ore from which about 500 tons per month of copper are being leached by weak sulfuric acid solution. The sulfuric acid for this operation is produced at Weed Heights. The open pit is being deepened to a point 800 feet below the surface and yields more than 600,000 tons of ore per month, from which more than 3,000 tons of copper is produced. 5

GHOST TOWNS AND HISTORICAL SITES

Nevada has numerous ghost towns. There are almost 600 old towns and camps scattered throughout the state that reflect the fabulous wealth, excitement, success, ingenuity, determination, drudgery and, occasionally, the disappointment, of Nevada's colorful mining history.

6 Virginia City is the most famous of all ghost towns. (map location 6). Rinky-tink pianos, old style music machines, and wooden-floored bars bring sounds of the past to the tourist. Fabulous mansions, museums, and galleries with invaluable historic treasures, are here to visit. It is too interesting to miss.

View from Fort Churchill in Lyon County, Nev. (Courtesy of Nevada State Highway Department.)

7 The Nevada State Museum in Carson City, capital of Nevada, is considered one of the ten best regional museums in this country (map location 7). It includes some outstanding, and constantly rotating, dioramas of historic and prehistoric Nevada. The most impressive feature is the model mine in the basement that adults and children can walk through. There is no admission charge, and the museum is open from 8:30 a.m. to 4:30 p.m., 7 days a week. The Nevada sandstone structure itself was once the United States Branch Mint, home of the famed and valuable "Carson City Dollar." The old mint was converted into a museum in 1941, and an addition was completed in 1971.

The Museum of the Mackay School of Mines, University of Nevada, Reno, contains one of the finest mineral collections in the United States (map location 8). Minerals and rocks from throughout the world are displayed according to geographic and geologic source and by mineral classification. One of the prize collections is a complete suite of ores from the famous Comstock Lode, many of which are no longer obtainable. An additional collection of minerals illustrates the Dana System of Mineralogy. The museum also contains a fluorescent mineral display, a fossil collection, an exhibit of molecular arrangements in crystals, and a display of historical mining equipment. The Mackay Museum is open weekdays from 8:00 a.m. to 5:00 p.m.

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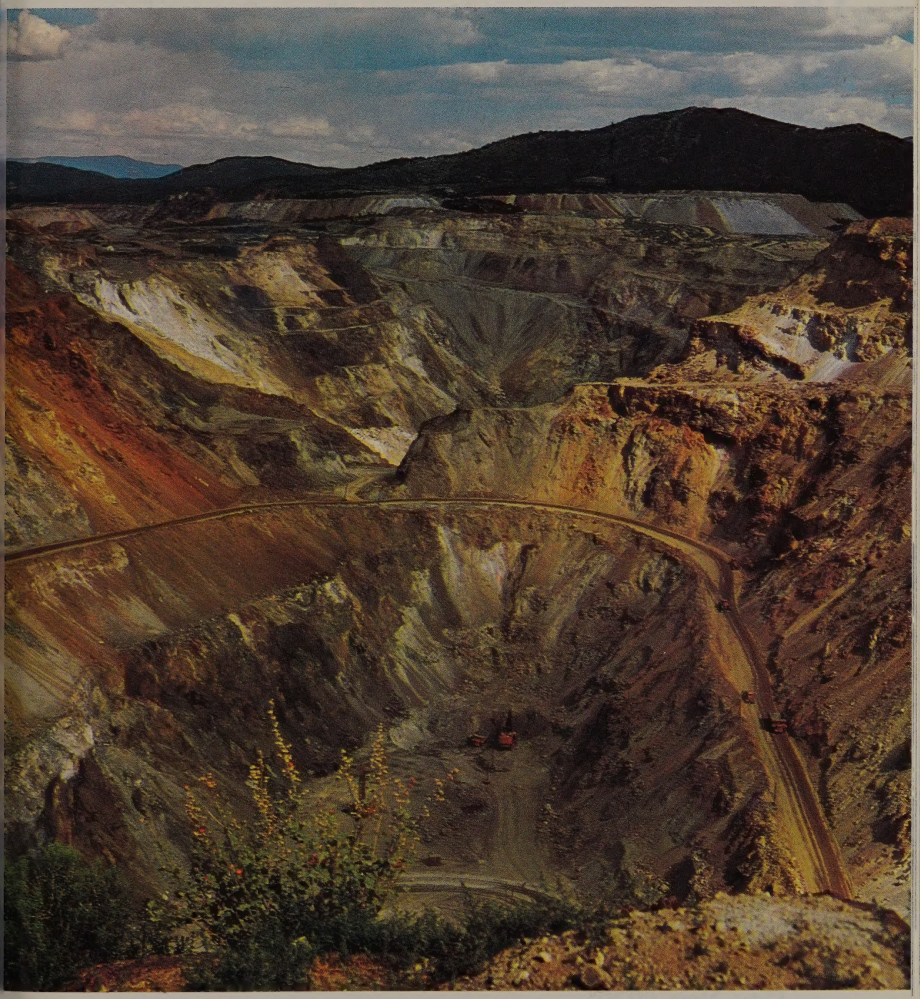

Veteran pit with the Tripp open pit of Kennecott Copper Corp. in the background, White Pine County, Nev.

Following, with map locations shown in parentheses, is a list of some of the most popular and interesting ghost towns of Nevada. Books and research can lead to as many as one would wish to explore.

9 Austin, Lander County (9)—silver boom of the 1860's.

10 Belmont, Nye County (10)—one of the best preserved of Nevada's ghost towns.

11 Cherry Creek, White Pine County (11)—no creek, no cherries, but a fun town during silver mining days.

12 Dayton, Lyon County (12)—center of Nevada's earliest mining fever in Gold Canyon region.

13 Eureka, Eureka County (13)—today resembles a stage setting for television western.

14 Fort Churchill, Lyon County (14)—the first regular military post in Nevada.

15 Genoa, Douglas County (15)—Nevada's first community.

16 Goldfield, Esmeralda County (16)—fantastic gold camp of early 1900's.

17 Hamilton, White Pine County (17)—once a population of 15,000; not a soul remains today.

18 Pioche, Lincoln County (18)—famous for its "million-dollar courthouse."

19 Rawhide, Mineral County (19)—one of the several early 20th century mining towns that sprang up after the Tonopah strike.

20 Rhyolite, Nye County (20)—classic example of southern Nevada ghost town.

21 Tonopah, Nye County (21)—most of the original town standing and in use today.

22 Tuscarora, Elko County (22)—a rootin' tootin' ripsnorter of a town—it has everything!

23 Unionville, Pershing County (23)—oldest schoolhouse in Nevada, now a museum.

6 Virginia City, Storey County (6)—"Queen of the Comstock Lode."

FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, U.S. Post Office Building, Room 306, 705 North Plaza Street, Carson City, Nev. 89701.

Department of Economic Development, State of Nevada, Capitol Building, Carson City, Nev. 89701.

Highway Department, State of Nevada, 1263 South Stewart, Carson City, Nev. 89701.

Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nev. 89507.

Nevada State Library, Old Federal Building, Carson City, Nev. 89701.

Nevada State Museum, 600 North Carson Street, Carson City, Nev. 89701.

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A diesel electric truck is being loaded by a 6-yard shovel on one of the benches at the Santa Rita copper mine. Tires on this large off-highway truck are more than 7 feet high.

NEW MEXICO

by

Joel N. Van Sant

New Mexico has great mineral wealth in legend and in fact. Usually ranked nationally among the top ten States for mineral production, the State has so many mineral resources that only a few of the more important mines, which are near tourist trails can be mentioned.

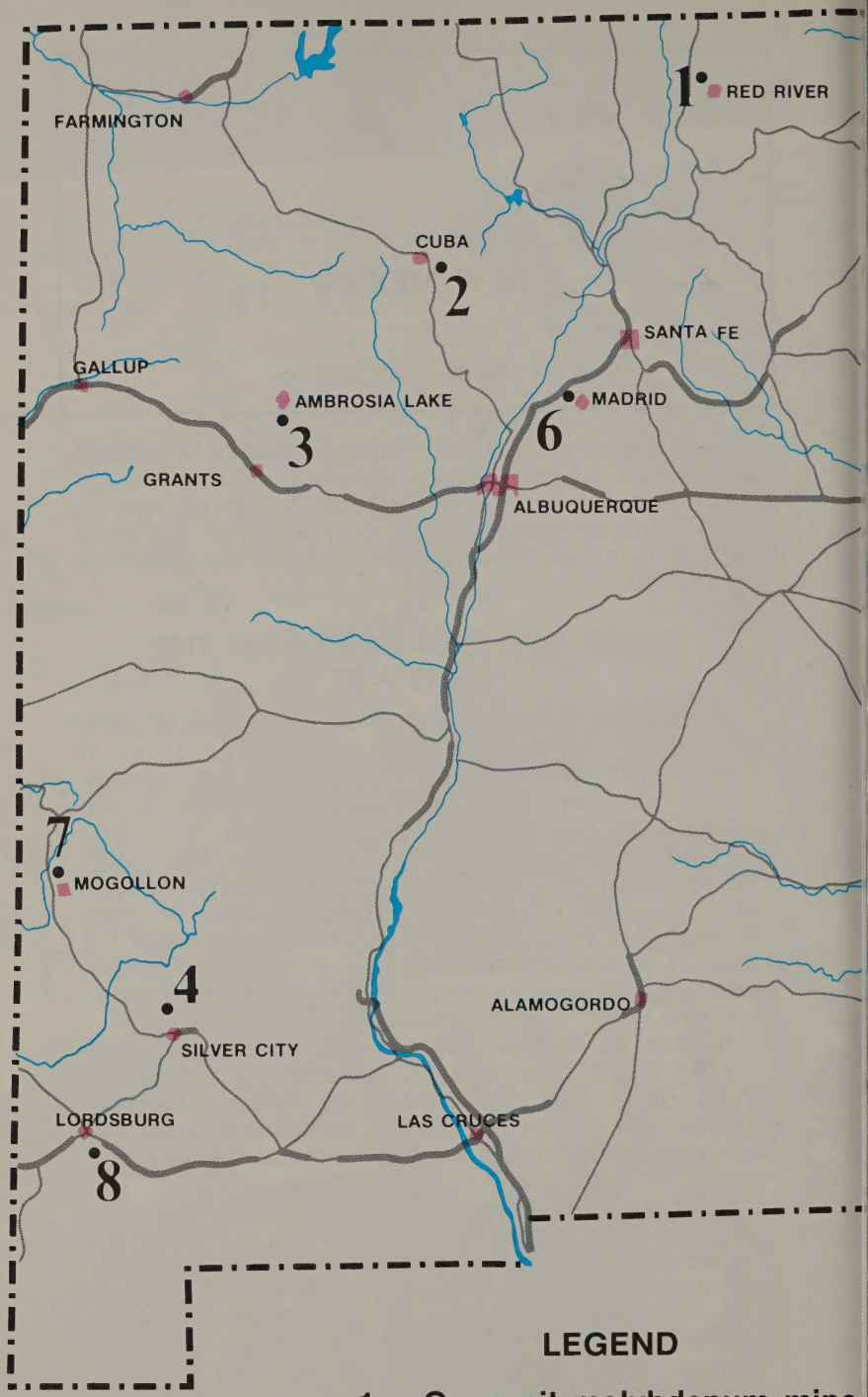
MINES YOU CAN SEE FROM THE HIGHWAYS

N. Mex. 38.—The mine plant of Molybdenum Corp. of America is between Questa and Red River in north-central New Mexico. Capacity of the concentrating unit, which is immediately adjacent to the highway, is 10,000 tons of ore each day. The open pit mine is out of sight on the north side of the road. Molybdenum has been mined in this same general area for approximately 40 years. N. Mex. 38 goes through Red River Pass a few miles to the east of the mine at an elevation of 9852 feet. Rugged and beautiful mountain scenery may be seen in the area. (map location 1). 1

N. Mex. 44, N. Mex. 126.—Nacimiento copper mine, started in 1971, is about 5 miles east southeast of Cuba, off N. Mex. 126. Modern equipment and technology now allows the mining of deposits known to Indians and Spanish since the middle of the 19th century (map location 2). 2

N. Mex. 53, N. Mex. 509, N. Mex. 334.—Numerous uranium mine headframes and several refineries can be seen from these highways north of Grants. Grants, claiming the title "uranium capital of the world" is on U.S. 66 West. Contact the Grants Chamber of Commerce for detailed information. Ambrosia Lake mining district, north of Grants, is a famous uranium center of the United States (map location 3). 3

U.S. 180, N. Mex. 90, N. Mex. 356.—There are many important copper-lead-zinc-silver mines between Silver City, Santa Rita, and Fierro. The headframes you see in the area serve underground mine workings.



LEGEND

1— Open pit molybdenum mine
2— Open pit copper mine
3— Uranium mining district
4— Copper-lead-zinc-silver mining district

5— Underground potash mines
6— Ghost coal mining camp
7— Ghost silver-gold mining camp
8— Ghost town

Continental, Ground Hog, and Hanover are the largest underground mines in the district. Continental completed an expansion program for mine and mill in 1973 that more than doubled its production (map location 4).

4

U.S. 62-180, N. Mex. 31, N. Mex. 360.—Numerous large mine headframes and potash refineries can be seen in the area about 15 miles east of Carlsbad. These prominent structures serve the underground potash mines, which are the major mineral fertilizer producers in the United States. After seeing Carlsbad Caverns, take time to visit this vitally important mining district (map location 5).

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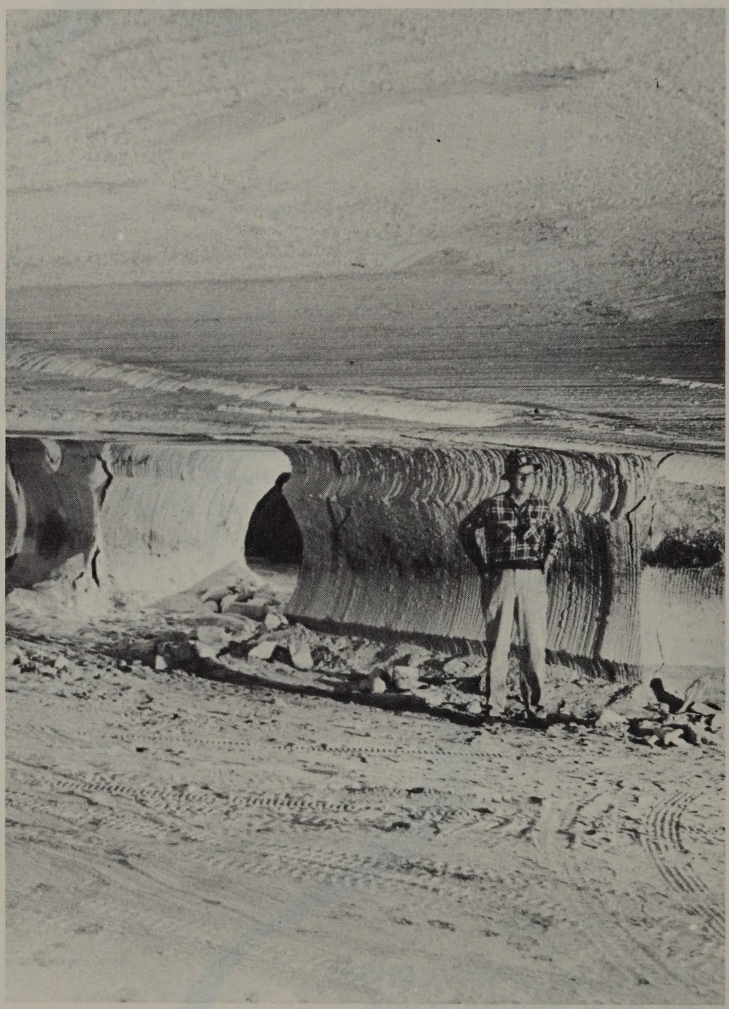

An underground potash mine in the New Mexico mined by the room-and-pillar method using continuous mining machines.

MINES YOU CAN VISIT

N. Mex. 90.—Tyrone, a ghost town since World War I, was resurrected in 1967 and is now the site of one of the most lively of New Mexico mining operations. This vast open pit mine makes Phelps Dodge's new development a living example of what changing technology can accomplish. A beautiful panoramic view of the big mining property can be seen from a vantage point constructed by the company. Free copper ore specimens are provided in bins at the view point, which is reached via N. Mex. 90 about 10 miles south of Silver City. Here, well-marked signs direct you west a short distance to the observation point (map location 4). **4**

U.S. 180, N. Mex. 90.—The Chino Mines observation site is at the north portion of the Santa Rita (Chino) open pit mine. A sign is provided on New Mexico 90 designating the observation site, which is located near the old Santa Rita store. The area is easily reached, on paved roads, and is open during all daylight hours. While viewing the beautiful varicolored geologic formation exposed by New Mexico's oldest and largest open pit copper mine, you can listen to a taped explanation of the mine operations. Tours of the reduction plant located about 10 miles to the south of U.S. 180 in Hurley are conducted by prearrangement. For information and arrangements for tours contact Public Relations Department, Chino Mines Div., Kennecott Copper Corp., Hurley, N. Mex. 88043, telephone 505-537-3381 (map location 4). **4**

GHOST TOWNS AND HISTORICAL SITES

N. Mex. 14, N. Mex. 22.—Madrid, a ghost coal camp, was active from 1888 to 1957. Because of igneous

The Santa Rita copper mine is more than 1 mile across and 1,000 feet deep.

activity, both anthracite and bituminous coals occurred and were mined in the same district. Madrid, when operating, was recognized nationally for its spectacular Christmas decorations. At night, the lighted camp and displays were a wonder to behold (map location 6).

6

U.S. 180, N. Mex. 78.—Mogollon, a ghost silver-gold camp, is in the heart of the Mogollon Mountains. Although first located and developed in 1875 by Army Sergeant J.C. Cooney, the Apaches harassed the miners until the 1880's and 1890's when more than $5,000,000 of silver and gold was produced. The last major activity was during the depression of the 1930's. It has been a ghost camp since World War II. Recently discovered by movie makers, this picturesque mining town should be appearing in future western television and movie programs (map location 7).

7

N. Mex. 25.—Pinos Altos, about 8 miles northeast of Silver City, was one of the first mining camps in the Silver City district. Gold, reported to be valued at nearly $5 million, was the primary production from the area. Gold is still found here and displayed as a novelty, but serious gold mining has not been done since the early 1930's. Due to its location near Silver City and its pleasant setting and climate, Pinos Altos contains numerous buildings and homes that remain occupied. In fact, Pinos Altos has one of the best eating places in Grant County. Housed in a replica of an old mine camp bar and melodrama hall, the restaurant creates an atmosphere that attracts visitors from all over the State and Nation (map location 4).

4

U.S. 80.—Two miles south of Lordsburg, a ghost town, Shakespeare, is privately owned. A tour is conducted only at 10:00 a.m. every day except Tuesday, and at 2:00 P.M. on Sundays. Contact Lordsburg-Hidalgo County Chamber of Commerce for directions and additional information (map location 8).

8

FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, P.O. Box 587, Albuquerque, N. Mex. 87103.

New Mexico State Bureau of Mines and Mineral Resources, Workman Center, Campus Station, Socorro, N. Mex. 87801.

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Kennecott Copper Corp. open pit copper mine at Bingham, Utah. Salt Lake City is in the valley area at the upper left corner of the photograph, adjacent to the Wasatch Mountains, which are 25 miles from the camera. (Courtesy of Kennecott Copper Corp.)

UTAH

by

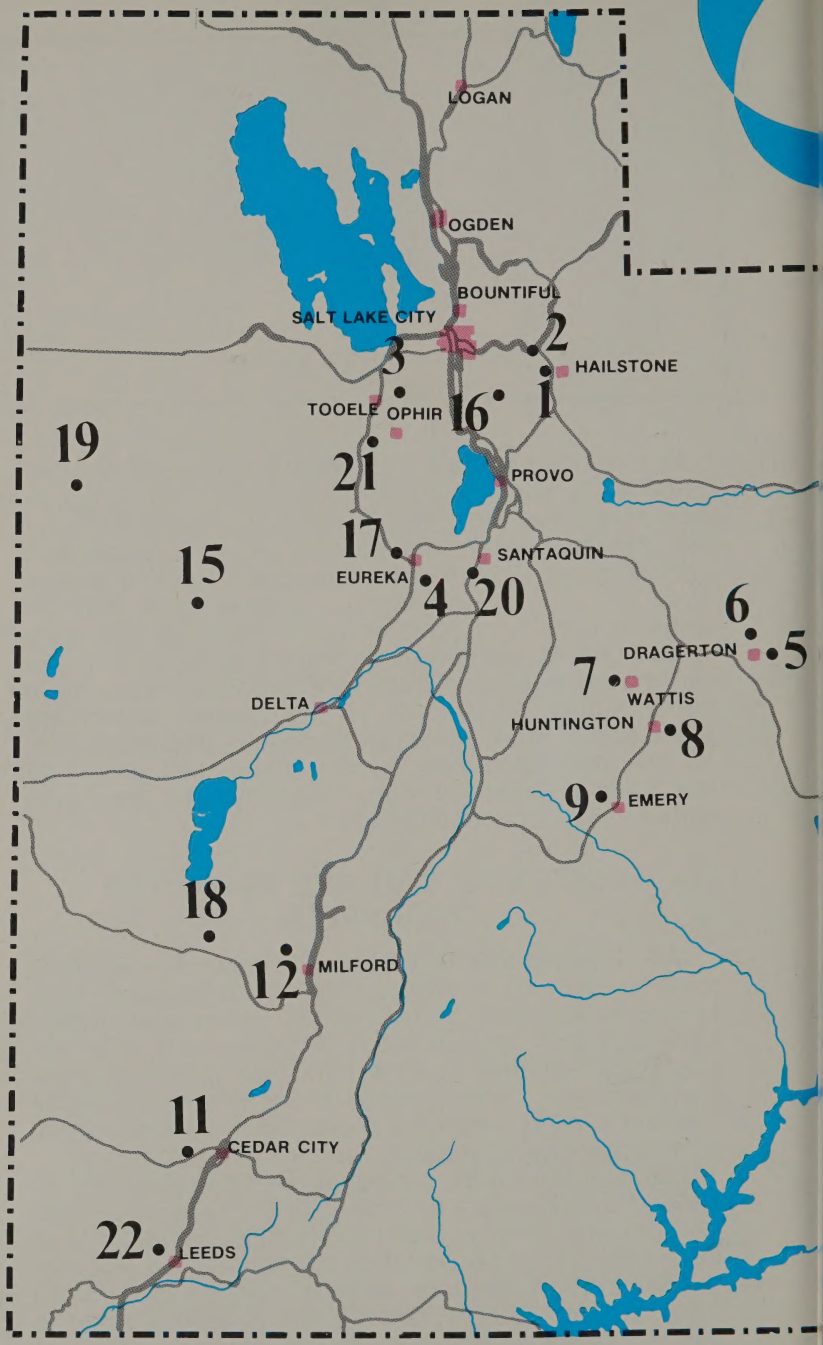
Stephen R. Wilson

Mining has been a highly important industry in Utah since early mineral discoveries in the 1860's, Lead-zinc-silver ores were first mined in quantity soon after this period. Large-scale copper ore production was started about 1903 from the area that is now the huge open pit mine at Bingham, and after more than 70 years of continuous copper yield, this great ore body is still one of the foremost copper producers in the world and undoubtedly will be a producer many years in the future. In additon to the copper, significant quantities of gold, silver, molybdenum, and other metals are recovered from the ore. Since 1969, Utah also has been a major producer of beryllium from ores mined in western Juab County.

MINES YOU CAN SEE FROM THE HIGHWAYS

U.S. 40, Utah 248.—The New Park (Mayflower) mine may be seen by driving a short distance west from Hailstone Junction on U.S. 40, 42 miles east of Salt Lake City and approximately 7 miles north of Heber City (map location 1). This mine has produced copper, lead, zinc, silver, and gold for many years until January 1, 1973, when ore production was terminated. Attempts are being made to reopen the mine. 1

The several mines controlled by United Park City Mines Co. are visible by driving to Park City over U.S. 40 and Utah 248, a distance of 27 miles from Salt Lake City, or to the portal of the Ontario No. 2 Drain Tunnel a short distance west of Keetley on U.S. 40 (map location 2). The Ontario No. 2 Drain Tunnel is currently the main haulageway for mining activities on properties of United Park City Mines Co. Historically, mines under control of United Park City Mines Co. have produced large tonnages of lead, zinc, and silver ores. At present no ores are being shipped from the properties. All work is concentrated on exploration. 2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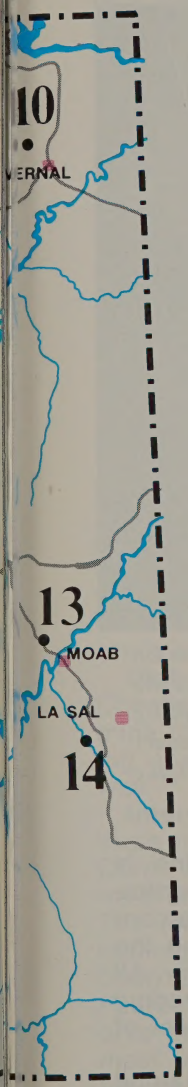

0 40 80 MILES

LEGEND

1— Copper-lead-zinc-silver-gold mining district (inactive)
2— Copper-lead-zinc-silver-gold mining district (inactive)
3— Large open pit copper mine
4— Underground lead-silver mine
5— Coal mine
6— Coal mine
7— Coal mine
8— Coal mine
9— Coal mine
10— Open pit phosphate rock mine
11— Open pit iron ore mine
12— Open pit copper mines
13— Uranium ore concentrator
14— Underground uranium mine
15— Open pit beryllium mine
16— Lead-zinc-silver mining district (inactive)
17— Lead-zinc-silver mining district (inactive)
18— Lead-zinc-silver mining district (inactive)
19— Copper-arsenic-gold-tungsten mining district (inactive)
20— Historic lead-silver-ore concentrator
21— Old gold-silver mining district (inactive)
22— Old silver mining district (inactive)

Interstate 15, Utah 48.—Visitors in the Salt Lake City area may take Interstate 15 and Utah 48 to Bingham to observe the huge open pit copper mine operated by Kennecott Copper Corp. (map location 3). The mine is visible from an observation point on the west side of the pit. Cars may be driven to within short walking distance of the observation platform.

3

Kennecott's Bingham Canyon mine as it appears from an elevation of 22,000 feet. To the northeast (upper right) is the small community of Copperton. Along the west side (left), snow marks the ridge that coincides with the boundary separating Tooele County on the west from Salt Lake County. (Courtesy of Kennecott Copper Corp.)

Ore from Kennecott's open pit copper mine is milled in the Magna and Arthur flotation concentrators near Magna, 13 miles north of the mine. The concentrates are treated in the Garfield smelter and the copper is further processed in the nearby refinery. All processing plants may be seen from roads leading from U.S. 50 or Alt. U.S. 50, 12 to 15 miles west of Salt Lake City.

The old town of Bingham, originally crowded along Binham Canyon, has been removed to permit expansion of the pit. Access to the mine area is along the narrow surfaced road in the bottom of the canyon. Current ore and waste production is so great it is difficult to visualize the magnitude of this huge operation. Approximately 108,000 tons of ore and near 250,000

tons of waste are mined daily to maintain this mammoth mining activity. Additional copper is recovered in the leaching plant in Lower Bingham Canyon, by passing water over the huge dumps and pumping the copper-bearing water to the leaching plant for copper precipitation and recovery. Approximately 35,400 gallons of water per minute is pumped to the leach dumps. Return copper-bearing water pumped to the leaching plant totals approximately 26,000 gallons per minute. Cement copper recovery from the leaching plant currently averages 124 tons per day.

U.S. 6-50.—The Burgin lead-silver mine, operated by Kennecott Copper Corp. lies a short distance south of U.S. 6-50, 4 miles east of Eureka (map location 4). This is a relatively new underground mine that has been producing high-grade ore for approximately 10 years. The Burgin mine lies adjacent to the Tintic Standard mine, an earlier important producer that is now idle. 4

A number of coal mines are easily accessible from Price, which is located on U.S. 6-50. At Dragerton and Sunnyside, large tonnages of coking coal are mined by U.S. Steel Corp. and Kaiser Steel Corp. for use in steel plants in the Western United States (map locations 5-6). Dragerton and Sunnyside lie approximately 24 miles east of Price over U.S. 6-50 and Utah 123 and 124. Several other coal mines are in operation south and southwest of Price at Wattis and near Huntington and Emery (map location 7-9). Utah 10 is the principal access road. Near Huntington, a unit of Utah Power & Light Co.'s coal-burning powerplant is currently under construction. 5 6 7 8 9

Utah 44.—Ten miles north of Vernal, Stauffer Chemical Co. operates an open pit phosphate rock mine and mill (map location 10). The mining and milling operation lies a short distance west of the highway. 10

Interstate 15, Utah 56.—Iron mining operations of three major companies, U.S. Steel Corp., CF&I Steel Corp., and Utah International, Inc., are 12 to 20 miles west and southwest of Cedar City (map location 11). The mines may be reached over Utah 56 and connecting nonsurfaced roads. The ores are mined by open pit methods in three areas known as three Peaks, Granite Mountain, and Iron Mountain. Some ores are beneficiated in a plant at Iron Springs, but most ores are shipped direct to steel plants at Geneva, Utah, Pueblo, Colo., or Fontana, Calif. 11

Utah 21.—Essex International, Inc., operates small open pit copper mines near Milford (map location 12). The mines are 4 to 7 miles northwest of Milford over dirt and gravel roads. 12

U.S. 163.—Atlas Corp. processes uranium ores in a custom mill at Moab (map location 13). A number of 13

mines located in Grand and San Juan Counties within 75 miles of the mill, ship uranium ores for treatment. Several mines are operated by Atlas Corp.

U.S. 163, Utah 46.—The uranium mine and mill operated by Rio Algom Corp. is in the Lisbon Valley area (map location 14). The mine is accessible from Moab over U.S. 163 for 22 miles, Utah 46 for 8 miles, and then gravel and dirt roads for 4 miles. The Rio Algom is a new mine that began production in October 1972. Two deep vertical shafts serve for transportation of men, supplies, and ore. The mill is adjacent to the mine.

14

U.S. 6-50.—Important new deposits of beryllium ore containing finely divided bertrandite are mined by Brush Wellman, Inc., in the Thomas Range (map location 15). This area is 52 miles west of U.S. 6-50, over a surfaced country road, from a point 10 miles north of Delta. Operations were started in 1969. The ore is mined in open pits and trucked to the company mill for processing. The mill is situated near the junction of U.S. 6-50 and the road leading to the mine. This operation produces a large part of the world's supply of beryllium from non-beryl ores. Historically, prior to the Brush Wellman project, most of the beryllium through the years was produced from large, hand-sorted crystals of the mineral beryl.

15

The building near the Silver King mine was used as a boarding house for many years while the mine was in operation. (Courtesy of Greater Park City Co.)

Skiers discussing mining operations with hard rock miners in a Park City district shaft house. (Courtesy of Greater Park City Co.)

MINES YOU CAN VISIT

Utah 248.—United Park City Mines Co., a longtime mineral producer in the Park City area, is also a participant in a large-scale recreational complex on the company's mineral lands (map location 2). Development of the recreation facilities was started in 1962. Most of the recreation involves skiing during the winter months, but a golf course, shops, and condominiums have also been constructed for nonwinter activities. Ski runs and lifts have been installed on the slopes adjacent to Park City. A gondola lift transports the skier or tourist to the mountain top at elevation 9,400 feet, passing over many of the mine workings and dumps. Ski trails to secondary lifts also traverse areas of many mine workings. 2

A mining museum has been established in the Spiro Tunnel to enable the tourist to see methods employed in mining ore 75 to 100 years ago as compared with current methods. The Spiro Tunnel was one of the principal early-day haulage and drainage tunnels, the portal of which is a short distance from Park City's main street. The tourist may ride the regularly scheduled enclosed man-train from the surface to the museum, 2½ miles from the portal of the Spiro Tunnel. During the summer months, the train operates four times daily, and in the skiing season, twice weekly. The man-train ride is sponsored by the Park City Resort.

Utah 48.—The Kennecott Copper Corp. open pit copper mine at Bingham is the most easily accessible for the tourist to visit. (map location 3). No prior arrangements need be made with company officals. The observation point is high on the west side of the pit and permits the visitor an excellent view of drilling, blasting, and ore waste haulage. The huge size of the pit makes the mining equipment, electric shovels, bulldozers, drills, trucks, and trains appear miniature by comparison. Tourists may see the blasting operations at approximately 3:15 p.m. daily from the observation platform.

3

GHOST TOWNS AND HISTORICAL SITES

Interesting ghost towns and historical sites related to mining and mineral processing, are found in the western part of the State. Some areas are relatively inaccessible over little used roads.

Utah 210.—The lead-zinc-silver mining area at Alta lies at the head of Little Cottonwood Canyon (map location 16). Ores were first mined in this district about 1868, and ore production has been intermittent through the years. Most properties are presently inactive and have been for several years. The principal activity is now winter sports. Major development has taken place at Alta and in areas a short distance west of the townsite. Ore production from the area is secondary to the skiing activities.

16

U.S. 6-50.—Many inactive lead-zinc-silver mines lie adjacent to U.S. 6-50, within Eureka townsite and along the hillsides bordering the town (map location 17). Eureka is an interesting mining town and is still active even though most of the mines have been shut down for many years.

17

Utah 21.—Frisco is the site of the famous Horn Silver mine, an early producer of lead-zinc-silver ores beginning about 1879 and ending in 1931 (map location 18). There is no production at present. Population is zero at the Frisco townsite.

18

Gold Hill.—This old camp is in Tooele County, 56 miles south of Wendover, over Alt. U.S. 50 in Nevada for 28 miles, then 28 miles east over dirt roads (map location 19). Ores containing copper, arsenic, gold, and tungsten were first mined about 1871. Gold Hill is essentially a ghost town, but intermittent mining has taken place during recent years. It is a favorite area for rockhounds. The population ranges from 2 to 10 persons.

19

U.S. 6-50.—Harold Mill, an early mill utilizing a chloride process to treat ores from the famous Tintic Standard lead-silver mine at Dividend, is in the east Tintic district (map location 20). The mill is situated

20

a short distance east of Goshen, Utah County, alongside U.S. 6-50.

Mercur.—An old gold-silver camp, Mercur is located approximately 20 miles southeast of Tooele, over Utah 36 and 73 and 5 miles of dirt road (map location 21). Gold and silver production from this area began about 1873 and was most prominent in the early part of the present century. The district has been dormant since 1938, and the old town has no inhabitants. **21**

Town of Bingham, Utah, as it appeared in 1906. Smoke at the upper left represents emissions from the old Yampa smelter. (Courtesy of Kennecott Copper Corp.)

Silver Reef.—This district, an early silver producer from deposits found in sandstone, is 16 miles northeast of St. George over Interstate 15, and 1 to 2 miles of unimproved roads west of the highway (map location 22). Mining started about 1875 and continued to 1909. Some silver, with uranium, was produced during the period 1952-57. Present activity in the area involves State Park and real estate developments. **22**

FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, 1600 East First South Street, Salt Lake City, Utah 84112.

Utah Geological and Mineralogical Survey, University of Utah, Salt Lake City, Utah 84112.

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Tourists at observation platform viewing open pit mine. (Courtesy of Kennecott Copper Corp.)

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Uranium mining pit at Crooks Gap south of Jeffrey City, Wyo.

WYOMING

by

Charles A. Koch

Wyoming is often considered the energy storehouse of the Nation. Oil, gas, coal, uranium, and oil shale resources can be found in abundance in the many productive basins of the State. The most prominent of these basins are the Powder River in the northeast, Big Horn in the northwest, Wind River in the central portion of the State, Green River-Great Divide in the southwest and the Hanna in the south-central portion of the State. All of the basins produce oil and gas. The major coal-producing basins are the Powder River and Hanna. The Green River-Great Divide is the only basin containing oil shale deposits. Mining of uranium principally is done in the Wind River and Powder River Basins.

Tours to many of the mining and industrial installations can be made, but arrangements must be made beforehand.

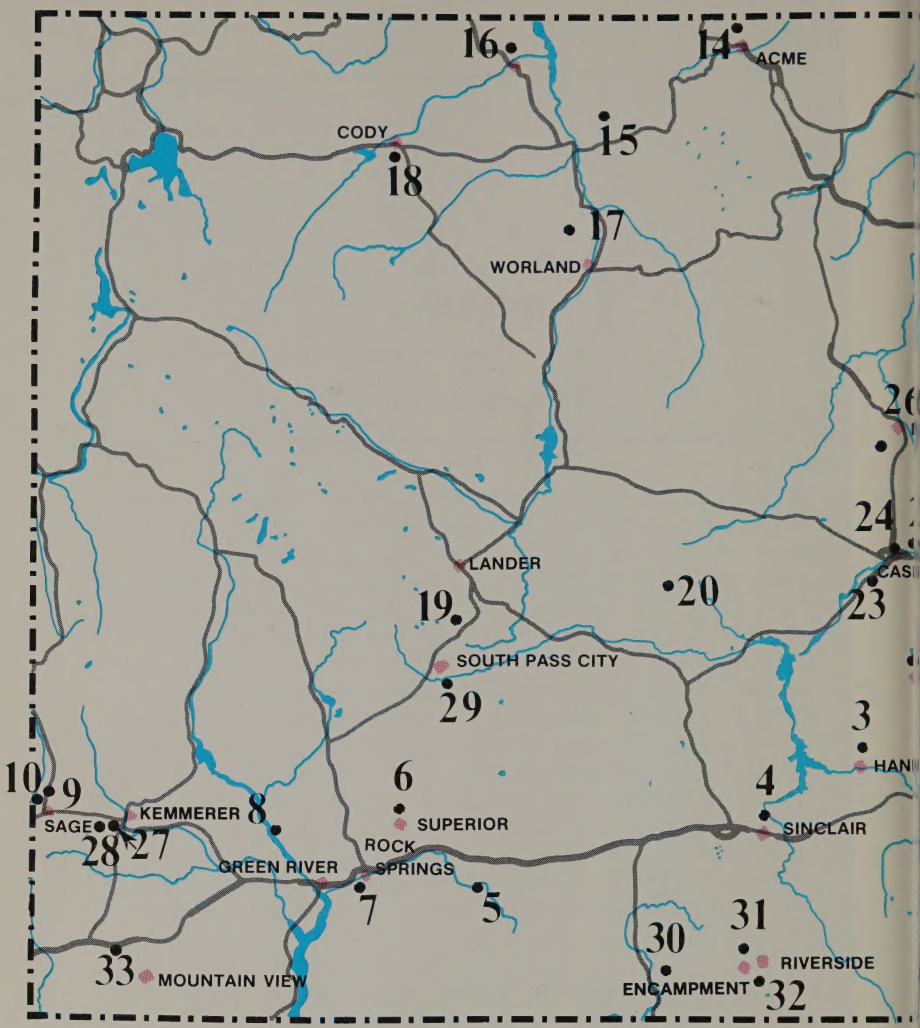
MINES AND PLANTS YOU CAN SEE FROM THE HIGHWAYS

Interstate 80, U.S. 30.—The capital city of Cheyenne, located in the extreme southeastern corner of the State, is the site of one of the two Husky Oil Co. oil refineries (map location 1). Daily throughput at the refinery is 23,600 barrels. 1

Just south of Laramie on U.S. 287 is Monolith Portland Midwest Co. cement plant on the west side of the highway (map location 2). The gypsum rock mine for the plant is located about a mile east of the plant. 2

The old coal mining town of Hanna can be seen by looking north at the junction of Wyo. 72 and U.S. 30. Beyond the town to the north, you can see the booms of large draglines that are removing the overburden to expose the coal for mining (map location 3). The coal mined by Rosebud Coal Co., Arch Minerals Corp. and Energy Development Co. is shipped back to the midwest where it is used to generate electricity. 3

Located at the town of Sinclair is the former Sin-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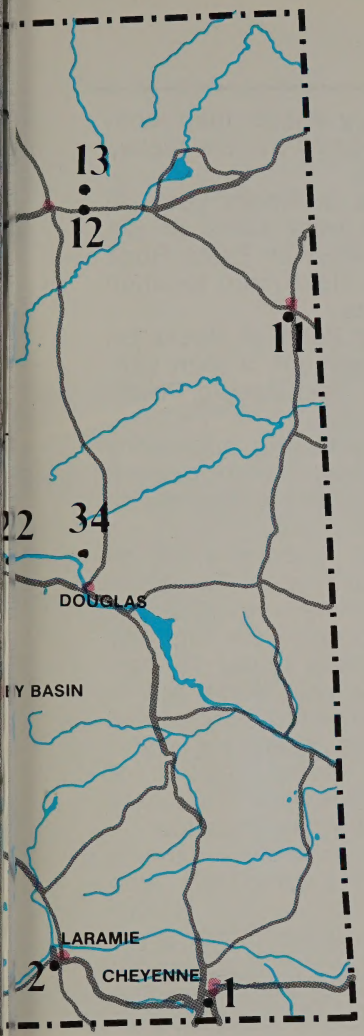
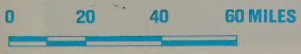
GREAT SEAL OF THE STATE OF WYOMING
EQUAL RIGHTS





LEGEND

1— Husky Oil Co. refinery
2— Monolith Portland Midwest Co. cement plant
3— Mining operations of Rosebud Coal Co., Arch Minerals Corp., and Energy Development Co.
4— Pasco refinery
5— Patrick Draw oilfield
6— Jim Bridger powerplant
7— Underground mining operation—Gunn Quealy Coal Co. Rainbow No. 8 mine
8— Trona mining operations
9— Stauffer Chemical Co. phosphate plant
10— Leefe phosphate mine
11— Tesoro Petroleum Co. refinery
12— Wyodak coal mine
13— Neil Simpson powerplant
14— Big Horn Coal Co. Big Horn No. 1 mine
15— Bentonite mines
16— Bentonite mills
17— Natural gas plant
18— Husky oil refinery
19— Atlantic City iron mine
20— Gas Hills uranium mining district
21—Shirley Basin uranium mining district
22— Dave Johnston powerplant
23— AMOCO refinery
24— Texaco refinery
25— Holding's Little America refinery
26— Salt Creek oilfield
27— Naughton powerplant
28— Sorensen mine
29— South Pass City
30— Ferris-Haggarty copper mine
31— Boston-Wyoming smelter site
32— Grand Encampment museum
33— Fort Bridger
34— Fort Fetterman

4 clair Oil Co. refinery now owned by Pasco (map location 4). The daily throughput of 48,600 barrels makes this the largest refinery in the State.

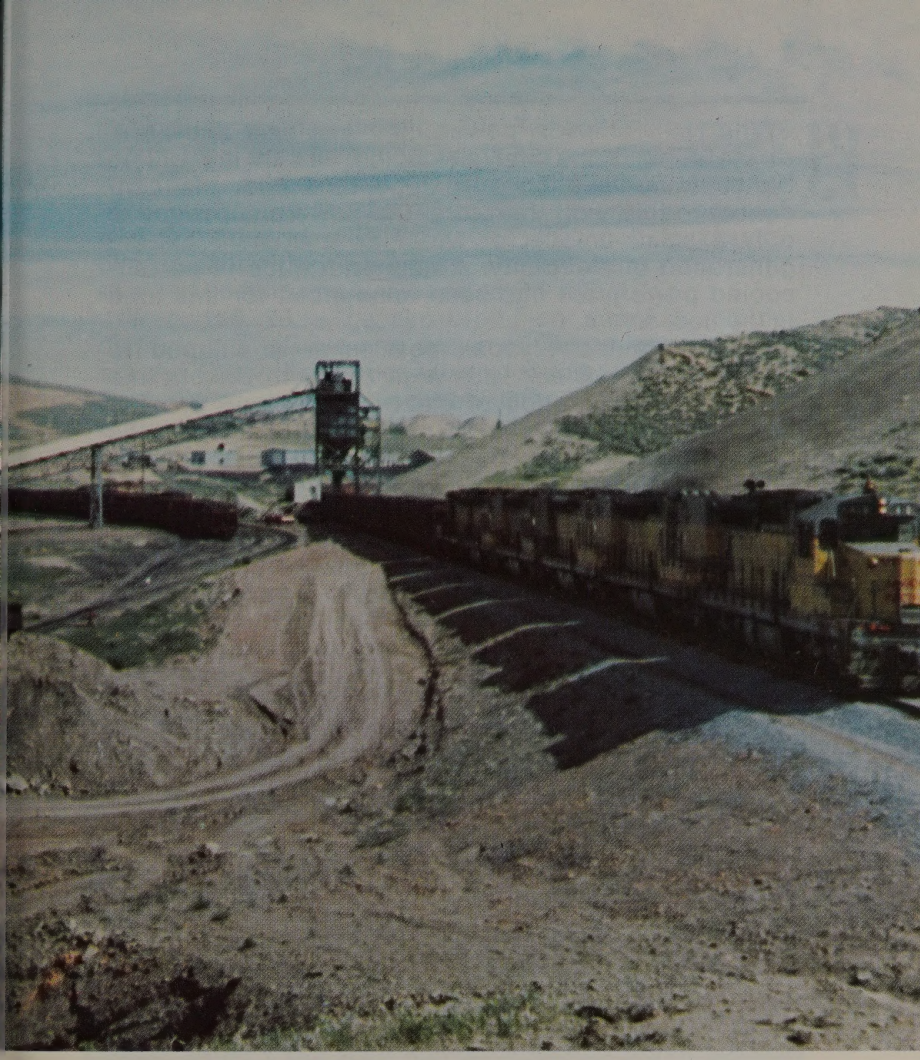
Between Table Rock and Point of Rocks you will see many pumping oil wells on both sides of the highway. Approximately 3 miles west of Table Rock
5 you pass through Patrick Draw oilfield (map location 5), one of the giant fields in the State.

Located about 9 miles north of Point of Rocks on Wyo. 371 is the Jim Bridger powerplant, a joint ven-
6 ture of Utah Power and Light Co. and Pacific Power and Light Co. (map location 6).

One of the active underground mining operations
7 in the State is located at Rock Springs (map location 7). If you are a mining man, a tour of this old mining community will bring back fond memories.

For the 30 miles west of Green River, you will be passing through the trona (soda ash) area. The trona mining area is located about 15 miles west of Green
8 River and from 6 to 12 miles north of the highway (map location 8). Wyoming produces about 45 percent of the Nation's natural soda ash. Soda ash is used in making glass, manufacturing chemicals, making paper, and as a cleaning agent for water treatment. Located 3 miles west of the junction of
9 U.S. 30 and S-89 is the Stauffer Chemical Co. Leefe phosphate rock processing plant (map location 9).
10 The plant processes ore from the company's mine at Leefe (map location 10) and from the company's mine in Utah. At the plant, the raw phosphate rock is converted to products for fertilizer plants and other phosphate consumers.

Wyodak mine east of Gillette, Wyo.



Loading area of Arch Minerals No. 2 mine in Hanna Basin.

U.S. 14, Alt. U.S. 14, U.S. 16, Interstate 90.—The Tesoro Petroleum Co. oil refinery is located at Newcastle (map location 11). Daily throughput of the refinery is 8,180 barrels. The crude oil is obtained from some of the many fields between Newcastle and Rozet. **11**

The Wyodak coal mine is both north and south of the highway near the town of Wyodak, east of Gillette (map location 12). A parking strip adjacent to the road is provided for tourists who wish to see the big open pit coal mine. Here one of the thickest coalbeds being worked in the United States can be observed. The seam, just over 100 feet thick, is very near the surface, so little overburden must be removed. Much of the mining is in a 75-foot coal seam south of the highway, but a similar pit is out of sight on the north side of the highway. **12**

13 The Neil Simpson powerplant just east and north of the mine is the first air-cooled unit in the United States (map location 13). Huge fans cool the condenser in this unit; therefore, the powerplant requires only a small amount of water as a coolant for the generation of electricity. A new and much larger air-cooled powerplant has been announced for this area in the near future.

Coal from the Wyodak coal mine is shipped to Osage and the Black Hills area of South Dakota and is used for generation of electricity. Annual production was 786,672 tons in 1975. This mine, the first and oldest active surface mine in the State, has been in operation since 1925.

14 Approximately 7 miles north of Sheridan on Wyo. 338, Big Horn Coal Co. Big Horn No. 1 surface coal mine can be seen on the west side of the highway (map location 14). The coal is mined from two seams, the upper seam (Armstrong) is 12 feet thick, and the lower seam (Monarch) is 44 feet thick. Annual production from this mine was 997,000 tons in 1974. Coal from the mine is shipped to powerplants in Nebraska, South Dakota, Colorado, and Wyoming and to other domestic and industrial users in Montana, Idaho, and Washington.

15 16 Bentonite, a special type of clay, is mined in many areas in the northern half of the state. Two of these mines can be seen north and south of U.S. 14 about 6 miles east of Greybull (map location 15). The bentonite is processed in mills, two of these mills are located at Lovell on Alt. U.S. 14, for use in oil well drilling muds, foundry sands, and for pelletizing taconite iron concentrates (map location 16). Wyoming produced over 2.3 million tons of bentonite in 1975. The location of other bentonite mills are 7 miles north of Greybull on U.S. 310, two mills at Colony on U.S. 212, at Upton on U.S. 16, and at Mills on U.S. 20-26.

17 The Big Horn Basin through which U.S. 14 and 16 traverses contains a number of oil and gas fields that produce sour gas or natural gas containing hydrogen sulfide. Before the gas can be marketed, the sulfur must be removed at a natural gas plant. One such plant is located 8 miles north of Worland on U.S. 16 (map location 17). The location of other gas processing plants are at Manderson on U.S. 16, Powell on Alt. U.S. 14, and Elk Basin on Wyo. 295.

18 The second oil refinery of Husky Oil Co. is located at Cody (map location 18). The daily throughput at the refinery is 10,600 barrels. The crude for the refinery is obtained from the oilfields in the Big Horn Basin.

Wyo. 28.—About 28 miles south of Lander, near south pass, is the Atlantic City iron mine and beneficiation plant—named after the nearby ghost gold

mining camp (map location 19). Taconite, a hard low-grade iron ore, is mined on a hill west of the road and trucked to a crushing-grinding plant. After magnetic concentration, the high-grade taconite produced is agglomerated with bentonite into pellets resembling a school boy's marbles. The resulting product is shipped 76 miles on a railroad to Geneva, Utah. 19

Wyo. 136, 75.—The two prominent uranium mining districts in the State and shown on most highway maps are the Gas Hills district (map location 20) and Shirley Basin district (map location 21). There are other uranium mines in the State, but they are not as accessable as these two mines. Occasionally the operating companies conduct tourists on short trips to the mines and mills. Even without tours, the mining operations can be seen from the roadways. The uranium minerals include meta-autunite, uraninite, and coffinite. The ore is processed, and the end product called yellow cake contains about 80 percent U_3O_8 (uranium oxide). 20 21

Big Horn coal mine north of Sheridan, Wyo.

Interstate 25, U.S. 87.—East of Glenrock and north of the highway is the Pacific Power and Light Co. 750-megawatt Dave Johnston powerplant (map location 22). The coal for the plant is hauled by train from the company's mine 18 miles north of the plant. 22

Casper, the oil capital of the State, contains three oil refineries, two east of the city and the other on the west edge of the city. The largest refinery is the AMOCO refinery west of the city with a daily throughput of 37,000 barrels (map location 23). The next largest is the Texaco refinery with a daily throughput of 23

22,000 barrels (map location 24). The easternmost refinery is the Little America refinery with a daily throughput of 13,500 barrels (map location 25).

Located at Midwest is the center of one of the world's greatest oil producing fields, the Salt Creek field (map location 26). While passing through the field, you will see the remnants of some of the first pumping units made, central power stations for the pumping units, and some stationary derricks.

U.S. 189.—The Utah Power and Light Co. 710-megawatt Naughton powerplant can be seen on the west side of the highway about 3 miles south of Kemmerer (map location 27). Coal for the plant is obtained from the Sorensen mine of Kemmerer Coal Co. just west of the plant (map location 28). Annual production from the mine was 1.7 million tons in 1975.

GHOST TOWNS AND HISTORICAL SITES

The ghost town of South Pass City can be visited by turning off S-28 about 35 miles southwest of Lander (map location 29). The 49'ers passed by this area on their way to California but returned when South Pass City became the center of the Sweetwater Gold Rush of 1967. South Pass City gained lasting fame when its representatives led the Wyoming Territorial Legislature (established 1868) in action to become the first governmental unit in the world to grant suffrage to women. Other mining camps in the area are Atlantic City Miner's Delight, and Lewiston.

The Grand Encampment mining district is located southwest of Saratoga on S-130 and S-70. There are three points of interest in this district. One is the Ferris-Haggarty copper mine site (map location 30), which contains several structures deteriorating due to the effects of a mountain climate and to human visitation. A result of these visitations is the removal of equipment or alteration of the property. The Boston-Wyoming smelter site is on the west bank of the Encampment River near the town of Encampment (map location 31). Since all of the buildings have been destroyed, the foundations and traces of walls are the only evidence of the smelter's former size.

The Grand Encampment museum complex is located in the southeast corner of the town of Encampment (map location 32). The museum property is a complex of buildings that are both historic and nonhistoric. Although the museum reflects the entire history of the region, special emphasis has been placed on the mining history of the district.

Fort Bridger was established in 1843 on the Black's Fork of the Green River by the famous trapper, trader, and scout Jim Bridger (map location 33). At first a trading post, the fort later played key roles in the

history of western overland transportation, communication, military affairs and agriculture. The fort is located within the community of Fort Bridger.

Fort Fetterman is located 10 miles northwest of Douglas on S-93 (map location 34). This fort was established in 1867 near the crossroads of the Bozeman Trail and the Oregon Trail to provide protection against hostile indians and as an army supply depot. Two structures still remain from the early era, one of which was a log officer's quarters now used as a museum and caretaker's home. 34

Many more historical sites are shown on Wyoming State Highway Department road maps.

FOR MORE INFORMATION WRITE OR VISIT

Federal Bureau of Mines Liaison Office, Room 8030, Joseph C. O'Mahoney Federal Center, P.O. Box 1796, Cheyenne, Wyo. 82001.

Wyoming Department of Economic Planning and Development, 720 West 18th Street, Cheyenne, Wyo. 82001.

Wyoming Geological Association, P.O. Box 545, Casper, Wyo. 82601.

Wyoming Geological Survey, Box 3008, University Station, Laramie, Wyo. 82070.

Wyoming Travel Commission, 2320 Capital Avenue, Cheyenne, Wyo. 82001.

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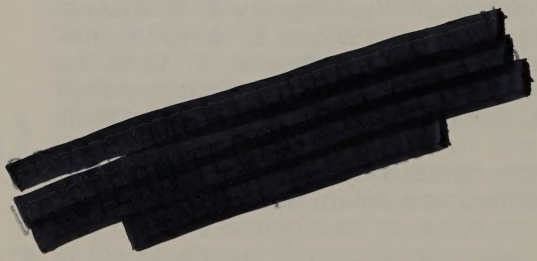

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